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USSR REPORT

SCIENCE AND TECHNOLOGY POLICY

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ORGANIZATION, PLANNING AND COORDINATION

PARTY ROLE IN DEVELOPING SCIENTIFIC PRODUCTION ASSOCIATIONS

Moscow VOPROSY ISTORII KPSS in Russian No 12, Dec 85 pp 62-74

[Article by Candidate of Historical Sciences T.R. Suzdaleva under the rubric "Socialism and Scientific and Technical Progress": "From the Experience of Party Supervision over the Organization and Strengthening of Scientific Production Associations"]

[Text] The levels of the acceleration of the economic and sociopolitical development of Soviet society are outlined in the drafts of the new version of the CPSU Program and the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000. "The economic strategy of the party," it was noted at the October (1985) CPSU Central Committee Plenum, "is specified with allowance made for the further intensification of the scientific and technical revolution. It is aimed at transformations of a truly historical scale--the accomplishment of the new technical renovation of the national economy and its changeover to the intensive path of development and the achievement by the Soviet economy of the highest level of organization and efficiency. And all this is in the name of man, for the good of man." (Footnote 1) ("Materialy Plenuma Tsentralnogo Komiteta KPSS, 15 oktyabrya 1985 goda" [Materials of the CPSU Central Committee Plenum, 15 October 1985], Moscow, 1985, p 7)

The solution of these problems will in many ways be ensured owing to the search for new methods of management and new forms of the organization of production. The party is bringing to the forefront as the main factor of intensification the cardinal acceleration of scientific and technical progress, which it is possible to achieve first of all on the basis of the further intensification of the integration of science, technology, and production. "The introduction everywhere of the latest achievements of science and technology in production, management, and the sphere of service and daily life," it is noted in the draft of the new version of the CPSU Program, "should be ensured. Science will completely become an immediate productive force." (Footnote 2) ("Programma Kommunisticheskoy partii Sovetskogo Soyuza. (Novaya redaktsiya). Proyekt" [The Program of the Communist Party of the Soviet Union (The New Version). A Draft], Moscow, 1985, p 27) The search for such organizational structures, which would make it possible to unite the efforts of scientists, engineers, and workers, to bring the nature and themes of scientific research closer to the needs of

production, and to speed up significantly the time of the introduction of scientific developments in the national economy, is one of the aspects of this process.

In the draft of the new version of the CPSU Program the need "to expand the network and to improve the work of production and scientific production associations," (Footnote 3) (Ibid., p 36) in particular, is spoken about. In this connection the experience of party supervision of the organization and strengthening of scientific production associations (NPO's), which are one of the leading and promising forms of the assurance of the integration of science, technology, and production, is of considerable interest. At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress, which was held in June 1985, there was noted the importance of "giving new impetus to the development of the network of large scientific production associations. They are called upon to become genuine outposts of scientific and technical progress, such as are today the Kriogenmash and Svetlana Scientific Production Associations, the association for the production of lubricating equipment in Nikolayev, and a number of others." (Footnote 4) (M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii. Doklad na soveshchanii v TsK KPSS po voprosam uskoreniya nauchno-tekhnicheskogo progressa 11 iyulya 1985 goda" [A Vital Question of Party Economic Policy. Report at the Conference in the CPSU Central Committee on Questions of the Acceleration of Scientific and Technical Progress on 11 July 1985], Moscow, 1985, p 21)

At present there are about 250 scientific production associations in the country. However, the experience of party management of their establishment and strengthening has not yet been adequately generalized in party history literature. This problem has been touched upon only in part, in general outline, in the research devoted to the activity of party organizations under the conditions of production associations. (Footnote 5) (See A.P. Dumachev, "Partiynyye organizatsii i proizvodstvennyye obyedineniya" [Party Organizations and Production Associations], Moscow, 1977; L.G. Obichkina, "Party Organizations of Production Associations," VOPROSY ISTORII KPSS, No 2, 1979, pp 64-74; G.I. Chernyshev, "Party Organizations and the Process of the Integration of Science and Production," VOPROSY ISTORII KPSS, No 9, 1983, pp 77-87; "Partiynaya rabota v usloviyakh proizvodstvennykh obyedineniy" [Party Work Under the Conditions of Production Associations], Moscow, 1984; A.G. Osipov, "Party Organizations and Scientific and Technical Progress," VOPROSY ISTORII KPSS, No 8, 1984, pp 22-34)

The works of social scientists, which have been published so far and which are to one extent or another devoted to the analysis of the development of the scientific and technical revolution, are helping to understand more clearly the importance of the daily work of party organizations on the increase of the role of scientific production associations in the acceleration of scientific and technical progress. (Footnote 6) (See A.I. Rogov, "Rukovodstvo KPSS ekonomikoy zrelogo sotsializma" [CPSU Management of the Economy of Mature Socialism], Moscow, 1975; T.V. Mukhina, Sh.M. Munchayev, "Istoricheskiye vekhi razvitogo sotsializma [Historical Landmarks of Developed Socialism], Moscow, 1981; "Razvitoy sotsializm: problemy teorii i praktiki" [Developed Socialism: Problems of Theory and Practice], Moscow, 1982; V.S. Lelchuk, Ye.E. Beylina,

"Promyshlennost i rabochiy klass SSSR v usloviyakh NTR" [Industry and the Working Class of the USSR Under the Conditions of the Scientific and Technical Revolution], Moscow, 1982, and others)

However, the lack of monographic works on this question does not make it possible to have a complete idea of the scale and purposefulness of the work which the CPSU is performing for the purpose of ensuring the acceleration of scientific and technical progress. The individual attempts of the workers themselves of scientific production associations, economists, and journalists to reveal the nature and importance of the activity of scientific production associations cannot fill this gap. (Footnote 7) (L. Koval, "Effekt sodruzhestva" [The Impact of Cooperation], Moscow, 1979; Ye.I. Mamut, "Effekt obyedineniya" [The Impact of the Association], Moscow, 1980; V.P. Zuyev, "Na strazhe kachestva" [On Guard Over Quality], Moscow, 1981; K.I. Taksir, "Upravleniye promyshlennostyu SSSR" [The Management of USSR Industry], 2nd revised and enlarged edition, Moscow, 1977, and others)

With allowance made for what has been said in this article an attempt is made to analyze, mainly on the basis of the materials of Moscow, the most important directions of the activity of the party, which is connected with the establishment and strengthening of scientific production associations during the 1960's through 1980's, to show the role of party organizations in the transformation of scientific production associations into centers, which effectively influence the acceleration of scientific and technical progress in the country, and to examine several questions of intraparty work under the conditions of scientific production associations.

The fundamental needs of the economic development of the country and the extensively developed scientific and technical revolution dictate the need for the improvement of the forms of the strengthening of the contact of science with production and the increase of the attention of research scientists to the problems which are directly connected with production activity.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Increase of the Efficiency of the Work of Scientific Organizations and the Acceleration of the Use in the National Economy of the Achievements of Science and Technology," which was adopted in 1968, (Footnote 8) (See "Resheniya partii i pravitelstva po khozyaystvennym voprosam. Sbornik dokumentov " [Decisions of the Party and Government on Economic Questions. A Collection of Documents], Vol 7, July 1968-1969, Moscow, 1970, pp 111-136) was of great importance for the stimulation of the efforts of party organizations for the search for new forms of the integration of science and production. Specific tasks of the party organizations and economic organs on the assurance of the more active introduction in production of the achievements of scientific and technical progress were specified in it. This decree was the first party document in which the very term "scientific production association" was mentioned.

The end of the 1960's also became a time of the formation of scientific production associations. In 1968 with the direct support of the oblast and city committees of the CPSU the Pishchepromavtomatika Scientific Production Association was established in Odessa, in 1969 the Pozitron, Plastpolimer, and

Elektrokeramika Scientific Production Associations were established in Leningrad. By the end of the 8th Five-Year Plan more than 10 scientific production associations were already in operation in Moscow. Among them are the VNIImetmash, Soyuzsteklomash, Agropribor, Neftekhim, Kondensator, and others. Subsequently such large scientific production associations as the Plastik, Soyuznauchplitprom, Soyuzgazavtomatika, Geotekhnika, Medoborudovaniye, and so on appeared in the capital. New scientific production associations were also organized in other cities.

In 1975 there were already 110 scientific production associations in the country. (Footnote 9) (See K.I. Taksir, "Upravleniye promyshlennostyu SSSR," p 190) This process also continued in subsequent years. The approval by the USSR Council of Ministers in late 1975 of the Statute on the Scientific Production Association (Footnote 10) (See "Resheniya partii i pravitelstva po khozyaystvennykh voprosam. Sbornik dokumentov," Vol 11, November 1975-June 1977, Moscow, 1977, pp 65-113) became an important landmark in the development of scientific production associations. The rights and duties of scientific production associations in the area of planning, financing, scientific and technical progress, capital construction, and material and technical supply and in other areas were specified in it. The adoption of the Statute on the Scientific Production Association attested that by the middle of the 1970's they had become firmly established and had acquired recognition in the system of the economic mechanism. The work on the formation of scientific production associations was also continued during the subsequent period.

The establishment of scientific production associations was a result of the creative search on the part of party organizations, scientists, and production workers for such forms of the strengthening of the contact of science with production, which made it possible to stimulate the introduction in practice of the achievements of science and to shorten the time of the development and production of new equipment. Here the experience of large production associations was actively used. It attested to the significant efficiency of the formation of such structures which included plants, construction organizations, design bureaus, and, in a number of instances, also scientific laboratories and large research subdivisions.

The party organizations analyzed and generalized the experience of the work of scientific production associations. At the All-Union Seminar of Party, Soviet, and Economic Workers, (Footnote 11) (See "Partiynaya rabota v usloviyakh proizvodstvennykh obyedineniy," p 33) which was held in 1970 in Leningrad in accordance with a decision of the CPSU Central Committee and was devoted to urgent questions of the activity of production associations, the problems connected with scientific production associations were also discussed. The importance of the formation of scientific production associations in the sectors, which are in the forefront of technical progress, was emphasized at the plenum of the Moscow City Committee of the CPSU, which was held the same year and discussed the question of increasing production efficiency and improving the management of enterprises of industry and transportation. (Footnote 12) (See the Party Archives of the Institute of Party History of the Moscow City Committee and the Moscow Committee of the CPSU (hereinafter the MPA), collection 1, inventory 169, file 5, sheet 25)

The basic tasks of the party committees and party organizations, which faced them in connection with the establishment of scientific production associations, were to unite the efforts of scientists and production workers in the matter of accelerating scientific and technical progress. Here it was necessary to overcome certain difficulties.

They were connected first of all with the fact that it was a question of the formation of associations which contained dissimilar subdivisions--both scientific and production. It was necessary to elaborate the most effective means which ensure the efficient interaction of both collectives, as well as their party organizations.

As in the case of the establishment of production associations, many difficulties were due to the fact that subdivisions, which were located in different rayons of the city, and at times outside it, were a part of the scientific production associations. Being accustomed to the former forms of organization proved to be a psychological barrier. The opinions of the authors, who believe that the reluctance of some managers to give up their personal interests, rights, and status, on the one hand, and the fear of assuming all the responsibility for the state of affairs at the association, which appeared among some management personnel, on the other, serve as obstacles in the way of the establishment of associations, seem correct. (Footnote 13) (See A.P. Dumachev, "Partiynyye organizatsii i proizvodstvennyye obyedineniya," p 16)

These problems were solved during the consistent and purposeful activity of the party committees and party organizations of the associations. The experience of the work of the party organizations of the collectives, which became a part of the Kriogenmash Association (Moscow Oblast), is significant. It appeared in 1971. The Machine Building Plant imeni 40-letiya Oktyabrya and scientific subdivisions were a part of it. Soon a unified party organization was formed there.

The first years were difficult for the association. It happened that the collective did not fulfill the production plans on a number of important indicators. (Footnote 14) (See SOVETSKAYA ROSSIYA, 17 May 1983) The fact that the party organizations did not immediately manage to concentrate forces on the main sections of the work of the scientific production association, had an effect. The imperfect procedure of planning, which did not aim the collective of the scientific production association at the implementation of new developments, also had an effect.

The Moscow Oblast Party Committee, having heard the report of the party committee of the scientific production association in the buro, indicated the need to use purposefully the force of the cooperation of the scientists, workers, and engineers, who were united in one collective. (Footnote 15) (MPA, collection 89, inventory 37, file 5, sheet 258; inventory 38, file 1, sheet 16) The communists drew the correct conclusions from the criticism, elaborated and implemented measures, which envisaged the solution of the most important problems facing the association, and performed much organizing and mass political work on the creation of a single, united collective of scientists and production workers.

Great importance in this case was attached to the increase of the role of communists in exercising the right to monitor the activity of the administration and in the economic work of the scientific production association. The monitoring was aimed at promoting the efficient use of the potentials incorporated in the new form of the integration of science and production. For this purpose the party committee of the association formed commissions for the monitoring of the activity of the administration, which were common for the production and scientific subdivisions. The very essence of the scientific production association as a unified collective was reflected in the work of each of them.

Joint meetings of the party and economic aktiv of the association, at which questions connected with the speeding up of the development of new equipment, the increase of product quality, and the improvement of the vocational training of workers were examined, became a part of the life of the party organization. The training of personnel began to be carried out in accordance with unified plans which were approved in the party committee. The coordination of the work of public organizations was carried out. (Footnote 16) (See "Partiynaya organizatsiya v usloviyakh proizvodstvennogo obyedineniya" [The Party Organization Under the Conditions of the Production Association], Moscow, 1977, p 176)

All this helped to increase the production indicators of the association and contributed to the uniting of the efforts of scientists and production workers in the accomplishment of the tasks facing them.

Interesting experience has also been gained by the party organizations of a number of other scientific production associations. The communists of the Plastik Scientific Production Association, for example, already at the first joint meeting of the party and economic aktiv, which representatives of the Karacharovskiy and Zagorsk Pilot Plants of Plastics, the scientific section of the scientific production association, and the Kharkov Special Design and Technological Bureau attended, examined the question of reserves and the possibility of the use of those advantages which are incorporated in the very nature of scientific production associations. (Footnote 17) (MPA, collection 215, inventory 1, file 75, sheets 4-7)

The posed tasks were accomplished owing to the acceleration of the introduction of developments of the scientific section of the association in production, the intensification of processes, and the introduction of means of mechanization in labor-consuming manual operations. The Kiyevskiy Rayon Party Committee of Moscow rated highly and endorsed the experience of the communists of the Plastik Association. (Footnote 18) (Ibid., file 78, sheet 11; file 80, sheet 108)

In 1972 the council of the Plastik Scientific Production Association was formed for the purpose of ensuring the coordination of the efforts of scientists, engineering and technical personnel, and workers in all the directions of scientific production activity. Workers, scientific associates of all the subdivisions of the association, and representatives of the administration and party, trade union, and Komsomol organizations became members of it.

In setting up the sharing of know-how, the party committee recommended to the management of the scientific production association to redistribute personnel among the scientific and production subdivisions. A number of specialists were sent for scientific research and design work to the departments of the scientific section. The communists of the scientific section conducted lessons in the shops of the main enterprise of the scientific production association and at affiliates, particularly at the Karacharovskiy Plant. (Footnote 19) (Ibid., file 80, sheet 109)

In 1973 the Buro of the Moscow City Committee of the CPSU adopted the decree "On the Work of the Party Organization of the Plastik Scientific Production Association on the Promotion Among Workers, Engineering and Technical Personnel, and Scientists of Scientific and Technical Knowledge and Advanced Know-How." (Footnote 20) (See MOSKOVSKAYA PRAVDA, 2 October 1973) In implementing the decree of the buro of the city party committee, the party committee of the scientific production association increased the attention to the questions of the training of personnel. For the purpose of increasing their skill the University of Technical and Economic Knowledge, which consists of three faculties--economics, mechanics and power engineering, and technology--began to operate. (Footnote 21) (MPA, collection 215, inventory 1, file 80, sheet 167; file 79, sheet 68) Particular attention was devoted to measures which contributed to the dissemination of scientific knowledge and achievements and to the promotion of the experience which had been gained first of all by the research subdivisions of the scientific production association.

All this contributed to the more thorough understanding by scientists of the immediate needs of production and helped production workers to be well informed about the achievements of advanced science and to master these achievements.

There was also much of value in the work of the party organization of the Soyuznauchplitprom Association. The Moscow (Podrezkovskiy) Experimental Plant of Particle Boards and Parts, the experience of the work of the party organization of which on the mobilization of the collective for the search for internal reserves of production in late 1971 was endorsed by the CPSU Central Committee, (Footnote 22) (See "Resheniya partii i pravitelstva po khozyaystvennym voprosam. Sbornik dokumentov," Vol 8, 1970-February 1972, Moscow, 1972, pp 627-628) was in charge of this association.

In conformity with the instructions of the CPSU Central Committee the scientific production association increased the attention to the questions of improving the skills of personnel and organized its own educational combine. In 1972 the communists of the association came forth with the initiative to hold a review and competition for saving and thrift. About 700 workers, engineers, and technicians participated in it. During the period from 1971 to 1973 alone the scientific production association gave assistance to more than 100 related enterprises on matters of technical renovation and the increase of labor productivity. In 1973 the economic impact from the introduction of works of the Soyuznauchplitprom Scientific Production Association came to 3 rubles 20 kopecks per ruble of expenditures. (Footnote 23) (MPA, collection 153, inventory 38, file 1, sheet 13) The party organization of the

scientific production association actively participated in the elaboration of the conditions of socialist competition not only for workers, but also for engineering and technical personnel. Such competition was entirely new in the work of the sector.

The need for the concentration of the efforts of scientists and production workers in the interests of the most complete utilization of the possibilities of scientific production associations and the increase of their contribution to the acceleration of scientific and technical progress required the improvement of the forms of party work. It was important here, with allowance made for all the diversity of the conditions of the activity of associations, to ensure the coordination of the efforts of the various subdivisions, which were a part of the scientific production associations, and the realization in practice of the vanguard role of the communists.

As in the case of the establishment of production associations, in those instances, when all the subdivisions of a scientific production association were on the territory of one rayon or city, unified party organizations were frequently established. In Leningrad, for example, unified party organizations were frequently formed prior to the official decision on the merging of the collectives into an association. Such was the case when forming the Plastpolimer Scientific Production Association and when uniting the Proletariy Plant with the scientific research institute of the Elektrokeramika Association. This enabled the communists to systematically and purposefully form a collective. (Footnote 24) (See A.P. Dumachev, "Partiynyye organizatsii i proizvodstvenyye obyedineniya," p 82)

The formation of unified party organizations made it possible to improve the planning of party work in order to concentrate the efforts of the communists of all the subdivisions of the scientific production association on the solution of the cardinal problems of the acceleration of scientific and technical progress and the strengthening of the contact of science with production. This also made it possible to ensure the more efficient placement of party forces in the decisive sections of the work of the scientific production association, to increase the attention to questions of the training of personnel, and to improve the practice of the management of the shop party organizations and party groups.

In those instances, when the subdivisions belonging to the scientific production association were located on the territory of different rayons, cities, and oblasts, their party organizations retained their independence. A mixed version of the structure of party organizations, when a unified party organization is established for the subdivisions of a production or scientific production association within a city or rayon, while the party organizations of the subdivisions, which are located in other rayons or cities, retain their independence, is also known.

This requires the search for different forms of the coordination of the efforts of communists of different subdivisions of the scientific production association. The councils of secretaries gave a good account of themselves.

Interesting experience of the work of the council of secretaries was gained at the Spektr Scientific Production Association. Here it arose almost at the same time as the establishment of the scientific production association, that is, at the beginning of the 10th Five-Year Plan. The secretaries of the party organizations of all the subdivisions: the Scientific Research Institute of Introscopy (Moscow), the Mosrentgen Plant (Moscow Oblast), the Kontrolpribor Plant (Moscow), and the flaw detection plant (Zaporozhye), became members of it. In this case the communists of the Moscow enterprises did not belong to a unified party organization. The council of secretaries was convened once a quarter.

Whereas initially the meetings of the council were to a certain degree of an information nature, subsequently, with the gaining of work experience, the most important questions of the activity of the party organizations of the scientific production association began to be submitted at them. The work was systematically summarized, the plans of the joint actions of the party organizations of the individual units were outlined, the socialist obligations and the progress of their fulfillment were discussed. (Footnote 25) (See MOSKOVSKAYA PRAVDA, 2 October 1979) The recommendations of the council of secretaries were examined in the party organizations, which outlined steps for their implementation. In the opinion of the communists of the association, precisely the council of secretaries played an enormous role in overcoming the psychological barrier in the way of establishing a truly unified collective of the Spektr Scientific Production Association.

The decrees of the CPSU Central Committee "On the Work of the Party Organizations of the Gorkiy Motor Vehicle Works Under the Conditions of the Production Association" (1976) (Footnote 26) (See "KPSS v rezolyutsiyakh i resheniyakh syezdov, konferentsiy i plenumov TsK" [The CPSU in Resolutions and Decisions of Congresses, Conferences, and Central Committee Plenums], 8th enlarged edition, Vol 12, 1978, pp 331-336) and "On Some Questions of the Organizational Structure and Forms of the Work of Party Organizations Under the Conditions of Production Associations in Industry" (1977) (Footnote 27) (Ibid., pp 462-467) were of great importance for determining the optimum structure of the party organizations of production and scientific production associations and effective forms of the coordination of the efforts of communists of various subdivisions of the scientific production association. In these documents the experience of work under the new conditions was generalized, the versions of the organizational structure of the party organizations of associations, which had justified themselves in practice, were ratified, and recommendations on the basic questions connected with the establishment and activity of the councils of secretaries were stated.

Scientific production associations have shown themselves to be an effective form of the integration of science and production. The time of the development of new equipment under the conditions of a scientific production association has been reduced to at least one-half to two-thirds. (Footnote 28) (See K.I. Taksir, "Upravleniye promyshlennostyu SSSR," p 221) At the same time it was not possible to see to it that the scale of the work on the establishment of scientific production associations satisfied the requirements of the times. The fact that adequate attention was not devoted to the

questions of the changeover of the economy to the primarily intensive means of development, had an effect.

It is envisaged by the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000, in particular, to speed up significantly the development of machine building and to increase its technical level. "In a priority manner," it is noted in this document, "to ensure the fundamental renovation and leading development of the machine building complex, first of all machine tool building, the production of computer hardware, instrument making, and the electrical equipment and electronics industries." (Footnote 29) (PRAVDA, 9 November 1985)

Steps, which ensure the priority development of the machine building complex, were specified in the decree of the CPSU Central Committee and the USSR Council of Ministers, which was adopted in 1985. (Footnote 30) (See PARTIYNAYA ZHIZN, No 16, 1985, p 4) Steps were also taken on the improvement of the management of machine building. (Footnote 31) (See "In the Politburo of the CPSU Central Committee," PRAVDA, 18 October 1985)

Domestic machine building was on the verge of a qualitatively new stage of its development--the changeover to highly efficient automated works, which, in turn, required the importance of modern machine tool building to be increased substantially.

In the solution of these problems scientific production associations are called upon to play an increasing role. In this connection the experience of a number of scientific production associations, which are actively and purposefully conducting research work in the most important directions of scientific and technical progress and are acting as the initiators of the introduction of advanced equipment and technology in their sectors, merits attention.

Thus, the Kriogenmash Association at present is producing more than half of the cryogenic equipment being manufactured in the country for the production of gaseous and liquid products and their storage and transportation. The share of new equipment in this case comes to 60-80 percent. Some types of products are being produced for the first time in world practice. Our country has been completely freed from the importing of cryogenic equipment. (Footnote 32) (See EKONOMICHESKAYA GAZETA, No 26, 1985, p 12) The items produced by the association are of a unique nature and are finding more and more extensive use in metallurgy, machine building, the chemical industry, and many other sectors.

More than 60 percent of the converter steel, more than 70 percent of the rolled products, and 80 percent of the aluminum rods are being produced on machines and units, which were developed by the collective of the VNIImetmash Scientific Production Association jointly with heavy machine building plants. (Footnote 33) (See MOSKOVSKAYA PRAVDA, 17 July 1985)

The fact that, for example, in the electronics industry, in which 80 percent of the scientific research institutes and design bureaus belong to such associations, it was possible to shorten to two-thirds the "research--

production" cycle, also attests to the great efficiency of the work of scientific production associations. The growth rate of labor productivity is 3-4 percent greater than on the average for the sector. The level of expenditures per ruble of commodity production is significantly lower, the output of new products, which satisfy the most advanced requirements, is increasing by twofold. (Footnote 34-35) (See PRAVDA, 9 July 1985)

The achievements of the collectives of scientific production associations became possible first of all owing to the purposeful work of the party organizations, which were able to mobilize the efforts of collectives for the solution of priority problems. The communists are keeping under control the progress of scientific research work and the process of the introduction of its results in production. Various means of party influence are being used for this.

The commissions of the party organizations for the monitoring of the activity of the administration have stepped up their work. At the Leningrad Svetlana Association, for example, five such commissions--for the monitoring of development and the use of fixed capital, the quality of the output being produced and the fulfillment of the plan on the products list, the efficient use of material and manpower resources, the output of consumer goods, the plan of economic and social development--have been set up and are working. (Footnote 36) (See "Partiynaya rabota v usloviyakh proizvodstvennykh obyedineniy," p 104) Monitoring commissions have also been established in various subdivisions of the association. They thoroughly analyze the results of the scientific and production activity of the collectives and elaborate recommendations, which help the party committees to focus attention on the priority problems of the acceleration of scientific and technical progress and to make the necessary decisions at the proper time.

Reports of communists on how they are fulfilling their production and public duties and what personal contribution they are making to the acceleration of scientific and technical progress, are heard systematically in the party organizations. At the ENIMS Scientific Production Association, for example, the reports of engineers, specialists of the scientific subdivisions, and plant brigade leaders are heard regularly in the party groups and shop party organizations. Managers of the subdivisions and the chief specialists give eports at the meetings of the party committee of the scientific production association. Here, as a rule, a frank, principled discussion is taking place, there is being indicated to the communists the need to use all means for increasing their personal contribution to the acceleration of scientific and technical progress.

The importance of this work especially increases, if it is taken into account that more than half of the doctors of sciences and over 40 percent of the candidates of sciences, who work at the scientific production association, are communists; 54 percent of the communists of the association have a higher education.

The reports of the communists are helping to identify, generalize, and disseminate advanced know-how of work. Thus, the party committee of the ENIMS Scientific Production Association rated highly the activity of department

chiefs and communists L.N. Grachev and V.L. Kosovskiy, who, in carrying out the scientific service of a large group of machine tool building plants, are constantly displaying concern for new means of metal working of the highest technical level. At the same time the party committee criticized those workers, who for the benefit of their own personal interests do not wish to abandon old themes, oppose the launching of new research, and avoid participation in the introduction of developments. (Footnote 37) (See PARTIYNAYA ZHIZN, No 17, 1985, pp 29-30)

The communists of scientific production associations are actively supporting the initiatives of workers, which are aimed at the acceleration of scientific and technical progress. At a number of associations, for example, multiple-skill brigades, which are completely responsible for the preparation of an item--from the scientific formulation of the idea to the adjustment of the finished equipment at the client's--have become widespread.

A search is being made for such forms of the organization of socialist competition within scientific production associations, which are conducive to the most effective use of the scientific and production potential. Thus, at the Kriogenmash Association the holding of review-competitions on saving and thrift, the decrease of manual labor, and the introduction of brigade forms has been stimulated in recent times. The defense of socialist obligations and the adoption of intense individual plans are being used extensively in practice. (Footnote 38) (See EKONOMICHESKAYA GAZETA, No 26, 1985, p 13) Socialist competition for the careful use of all types of resources has also been launched.

The communists of the VNIImetmash Scientific Production Association at the party conference to hear reports and elect officials in late 1983 outlined and at present are accomplishing the tasks, which are connected with the changeover from the development of individual machines and devices to the production of systems, which ensure the complete automation and mechanization of production processes, the decrease of manual labor, and the efficient use of material and manpower resources. (Footnote 39) (See MOSKOVSKAYA PRAVDA, 19 October 1983)

The collectives of many scientific production associations are acting as the initiators of valuable undertakings, which are aimed at the increase of the quality and the shortening of the time of the development of new equipment, the speeding up of its introduction in production, and the assurance of an increase in labor productivity. During the current five-year plan, for example, several Leningrad production and scientific production associations came forth with an initiative, which envisaged to provide the entire increase of the output of products and an increase of the amount of research with an actual decrease of the number of workers. (Footnote 40-41) (See "Partiynaya rabota v usloviyakh proizvodstvennykh obyedineniy," pp 37-38) The implementation of initiatives of this sort is conducive to the involvement of the broad masses of workers in the matter of accelerating scientific and technical progress and helps each labor collective to find new reserves and possibilities.

Practical experience shows that one of the conditions, which ensure the role of scientific production associations as outposts of scientific and technical progress, is their cooperation with leading scientific institutions and with production collectives. The experience of the Energiya Scientific Production Association, at which the flexible automated sections, which are equipped with domestic machining centers and computer technology, are providing a sixfold increase of labor productivity, was noted at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. (Footnote 42) (See M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii," p 14)

The combining of different hardware--computers, machine tools, devices--into a unified production complex with common control was ensured at the association. During the accomplishment of this task on the initiative of the management and party organization of the scientific production association direct creative contacts were established with the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences and the Ivanovo Machine Tool Building Association imeni 50-letiya SSSR. Owing to such cooperation the first flexible machine system was designed and introduced at the Energiya Association in just a year, a second one--in 6 months. (Footnote 43) (See SOVETSKAYA ROSSIYA, 21 August 1985)

The party committee of the association is aiding in many ways the strengthening of the contacts of the departments and laboratories of the VNIImetmash Scientific Production Association with design bureaus and plants. During the current five-year plan 87 contracts of the association with various enterprises were in effect. The cooperation assumed various forms. Thus, for example, at the Moscow Serp i molot Plant the members of the People's Control of the scientific production association and the plant jointly carried out the monitoring of the development and introduction of new equipment. The steps taken on the signals of the members of the People's Control helped to eliminate in time the shortcomings in work and contributed to the delivery of equipment on time.

The party organizations of scientific production associations are performing much work on the improvement of the personnel training system and the formation among workers of advanced economic thinking. The extensive promotion of economic, scientific, and technical knowledge, individual work with people, particularly with those who have been included in the reserve of personnel for promotion, and the steps being taken on the improvement of the placement of personnel with allowance made for the requirements of the times are contributing to this.

In spite of the positive results, it is impossible not to see, however, that difficulties exist in the way of the establishment of new scientific production associations and in the work of operating ones, which was noted at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress.

Far from all ministries and departments are taking into account the tasks of scientific production associations and the peculiarities of this form of organization, which is called upon to develop, as a rule, unique equipment (as

compared with production associations and enterprises, which are oriented toward the production of series-produced output). Some ministries are keeping the scientific production associations subordinate to them busy with work which does not have a direct bearing on the development of new equipment. For example, the VNIIstroydormash Scientific Production Association annually receives from the Ministry of Construction, Road, and Municipal Machine Building more than 3,000 assignments of this sort, and a significant portion of the staff members are being diverted for their fulfillment. This is interfering with the work of the scientific production association and is hindering the development of machines, the technical level of which should meet the present requirements. (Footnote 44) (See PRAVDA, 16 July 1984)

The increase of the economic efficiency of the developments, which are being implemented by scientific production associations, is a serious problem. Even at those of them, which are actively and extensively introducing their products in production (for example, the Kriogenmash, ENIMS, VNIImetmash, and TsNIITmash Associations), it could, as the specialists of the associations believe, be greater, if innovations were put into series production in a shorter time.

The inadequate attention of enterprises to questions of the assimilation of advanced equipment is having the result that the time of the introduction of new items is increasing, while the items themselves are beginning to become obsolete. Frequently in this case during the introduction of the developments of scientific production associations in series production many complicated technical innovations are "simplified" by the manufacturing plants, which substantially decreases the economic impact.

In the draft of the new version of the CPSU Program great importance is attached to the increase of the effectiveness of planning as a tool of the implementation of the economic policy of the party, it is noted that planning "is called upon to be an active lever of the acceleration of the socioeconomic development of the country, the intensification of production on the basis of scientific and technical progress, and the implementation of advanced economic decisions, to ensure the balance and dynamic growth of the economy." (Footnote 45) ("Programma Kommunisticheskoy partii Sovetskogo Soyuza. (Novaya redaktsiya). Proyekt," p 34) In this connection it should be noted that the prevailing principles and norms of planning, stimulation, pricing, and the evaluation of product quality often do not create the conditions for the proper coordination of the work of the scientific and production subdivisions within the scientific production association. The plans of the scientific and production activity of the subdivisions of scientific production associations are not properly coordinated. Thus, the plans of the scientific subdivisions are approved along the line of the USSR State Committee for Science and Technology, while the plans of plants are approved along the lines of the USSR State Planning Committee, moreover, frequently the results of all the activity of the association are evaluated only according to the volume indicators, without allowance made for the degree of novelty of the equipment being produced. (Footnote 46) (See SOVETSKAYA ROSSIYA, 23 June 1985) The pilot works frequently engages in the production of series-produced output, which, by logic, other enterprises of the sectors should assimilate. The question of

the optimum size of the scientific production association is unresolved. Difficulties of this sort have already more than once led to the break up of the scientific production association into the former subdivisions and the transformation of scientific production associations into production associations, which to a significant degree hindered the acceleration of scientific and technical progress in the corresponding sectors. (Footnote 47) (See VOPROSY EKONOMIKI, No 1, 1985, p 71)

The utmost increase of the level of party work and the consistent implementation of the measures of the party, which are aimed at the acceleration of scientific and technical progress and the improvement of the economic mechanism, are called upon to serve the surmounting of these difficulties.

The need to increase the role of the basic production unit--production and scientific production associations and enterprises, having ensured the fundamental unity of their rights and duties, is spoken about in the draft of the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000. "To see to it," it is noted in the document, "that the economic mechanism would orient labor collectives as much as possible toward the acceleration of the growth rate and the increase of the efficiency of production, the introduction of new equipment, the constant improvement of technology, the output of products of the highest quality." (Footnote 48) (PRAVDA, 9 November 1985) In this connection, in particular, the changeover of scientific production associations to the new conditions of management is of great importance.

Meanwhile a number of unsolved problems still exist here. It was not always possible, in particular, to develop the optimum conditions of the economic experiment as applied to pilot production, which decreased the efficiency of work. The question of how to see to it that the new mechanism of management would effectively stimulate the creative activeness of the workers of the scientific subdivisions, which are a part of the scientific production association, is also arising. Here, too, much depends on the extent to which the spirit of the times has spread in party organizations, how resolutely they are posing the urgent questions of the work of associations to ministries and in their own collectives, and how actively they are ensuring the vanguard role of communists in the collective. The implementation of the decree of the CPSU Central Committee and the USSR Council of Ministers "On the Extensive Dissemination of New Methods of Management and the Increase of Their Influence on the Acceleration of Scientific and Technical Progress" will contribute in many ways to the solution of these problems.

Under the conditions of the scientific production association the problem of forming the advanced economic thinking of personnel is acquiring greater and greater urgency. Here it is important to note that, on the one hand, the very nature of scientific production associations is objectively conducive to the broader vision by workers of the essence of the problems connected with the assurance of the integration of science and production, the thorough understanding of the importance of the work being performed by associations, and the creative search for means of surmounting the difficulties. On the other hand, it is important in the various forms of political and economic

education, mass political work, and so on to take into account the peculiarities of the scientific production association as a whole, as well as each subdivision of it, so that the workers of scientific subdivisions would see more clearly the needs of production, while production workers would constantly be well informed about the latest achievements of science. The increase of the number of scientific production associations and the increase of their role in the national economy are also causing, obviously, the need for the formulation of special programs for the system of economic education as applied to the conditions of the scientific production association.

The large-scale tasks, which are connected with the improvement of ideological educational work, are specified in the draft of the new version of the CPSU Program. Perhaps, it also makes sense to speak in the Program about the need for the substantial increase of the attention to the questions of the economic training of personnel with allowance made for the fact that such training and the formation of advanced economic thinking of workers under the conditions of the intensification of production and the acceleration of scientific and technical progress are acquiring increasing importance.

New demands are also being made on the work of party organizations with management personnel as a whole. For scientific production associations it is especially important that the managers not only would have thorough knowledge in the corresponding fields of science, but would also look thoroughly into the questions of the economics and organization of production and would be able in everyday work with people to take into account the specific nature of each subdivision and to coordinate the efforts of the scientific and production subdivisions in the interests of solving the problems common to the association. Much depends here on how skillfully and competently the party organizations settle the questions of the selection and placement of management personnel of the scientific production association. Along with this it makes sense, it seems, to specify measures which would ensure the purposeful training and advanced training of the management personnel of scientific production associations in the general system of the improvement of the skills of personnel for the national economy.

A number of problems also exist in connection with the very organization of party work under the conditions of the scientific production association. Thus, in some cases the party organizations of scientific production associations are under the jurisdiction of the industrial transportation departments of the rayon party committees and in others under the jurisdiction of the departments of science and scientific institutions. It also happens that in one rayon the party organizations of different scientific production associations are under the jurisdiction of different departments.

Practical experience for the present has not given an answer to the question of which version is more advisable. It should be noted, however, that this problem has not yet received proper analysis, although the need for generalization of the gained experience exists.

The noted difficulties do not change the main thing. Scientific production associations are in the front lines of scientific and technical progress. Speaking at the conference of the party and economic aktiv in Tselinograd,

Comrade M.S. Gorbachev characterized scientific production associations as the most efficient form of the assurance of the advance of research developments into practice. (Footnote 49) (See M.S. Gorbachev, "Narashchivat prodovolstvennyye resursy. Vystupleniye na soveshchanii partiyno-khozyaystvennogo aktiva oblastey Kazakhstana, krayev i oblastey Sibiri i Urala 7 sentyabrya 1985 goda" [Increase the Food Resources. Speech at a Conference of the Party and Economic Aktiv of the Oblasts of Kazakhstan, the Krays and Oblasts of Siberia and the Urals on 7 September 1985], Moscow, 1985, p 27)

The communists of scientific production associations, while discussing the drafts of the new version of the CPSU Program, the changes in the CPSU By-Laws, and the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000, are outlining great gains. Suggestions on means of the further increase of the role of scientific production associations in the accomplishment of the tasks posed by the party and the improvement of the work of the party organizations, which are called upon to concentrate the efforts of each collective on the search for new reserves and possibilities, are being made at party meetings and conferences.

Large-scale tasks, which are connected with the assurance of the cardinal acceleration of scientific and technical progress, are specified in the drafts of the documents, which the 27th CPSU Congress has to adopt. An important role in their accomplishment is also being assigned to scientific production associations. It is envisaged by the draft of the Basic Directions of USSR Economic and Social Development to aim the efforts of the collectives of scientific production associations "at the development and extensive introduction of new generations of equipment and technological complexes, the constant improvement of equipment and production technology." (Footnote 50) (PRAVDA, 9 November 1985) It is also intended to include in scientific production associations sectorial scientific research, design, and technological organizations. All this is called upon to broaden the possibilities of scientific production associations in the process of the intensification of the integration of science, technology, and production and in the matter of the changeover of the economy to the intensive means of development.

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MOVE TO STANDARDIZE PLANNING AND FINANCING IN SCIENTIFIC-TECHNICAL PROGRESS

Moscow FINANSY SSSR in Russian No 1, Jan 86 pp 42-45

[Article by I.I. Glotov, director of the Food Industry Central Scientific Research Institute of Information and Technical and Economic Research: "Standardized Planning and Financing of Scientific-Technical Progress"]

[Text] The realization of goals, envisioned in the draft of the Basic Trends of Economic and Social Development of the USSR for the 1986-1990 Time Period and for the Period up to 2000, pre-determines the need to shift extensively over to intensive forms of development and operation in agro-industrial production. The definitive factors of intensification are: the acceleration of scientific-technical progress, an increase in labor productivity, and a reduction in the specific expenditure of resources used in economic turnover. Here, we must also consider the best possible use of these resources. Under these conditions, the role of fiscal-economic levers in both science and production, particularly in solving problems associated with the acceleration of scientific-technical progress (STP), is growing substantially. The requirement is emerging for the development of a mechanism to plan and finance this progress as well as possible.

Important considerations in the acceleration of scientific-technical progress include a reliable earmarking of the resources necessary for scientific research and experimental design work, as well as these resources' optimal distribution throughout the republics, industrial branches, scientific-research organizations and other sectors. These considerations also include the fixing of priorities with regard to the goals of STP and the commensuration of expenditures on science with the ultimate results applied to production.

The operational directorates of industrial ministries, as currently set up, do not have a reliable mechanism for accurately determining the necessary financial resources for the acceleration of STP or precisely equalizing the amounts of these resources with regard to the possibilities of scientific potential and its ultimate implications for production overall. A mechanism is also lacking for determining which trends in STP are important and what priority they should receive. Optimal structures for financing specific commensuration of the expenditures on financial resources and their yield with regard to the implementation of science in production and the establishment of an optimal structure for financing within industrial branches and the republics have yet

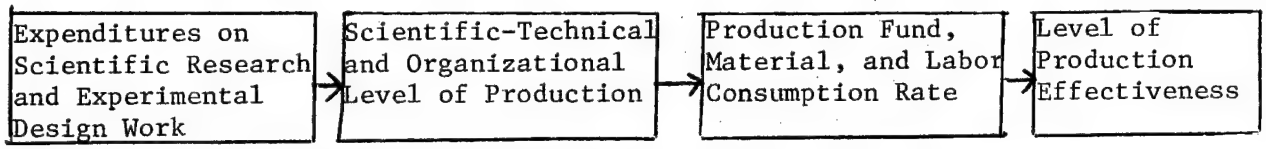
to be worked out. All of these considerations have reduced the amount of activity of financial-economic levers and their effect on the process of the acceleration of STP; this has led frequently to a reduction in the effective utilization of allocated resources, which are dispersed throughout numerous scientific-research organizations performing trivial, sometimes overlapping, work, as well.

The establishment of a combined fund for scientific and technological development in the ministries and departments has enhanced the direct dependence of the amount of financial resources received by an industrial branch, republic and non-governmental organizations to accelerate STP, on the results of production efforts. The question, however, is: How are we to ensure the optimal distribution of this fund for the period planned, taking into account the numerous routes of financing within the framework of the entire industry? In actuality, ministry-level specialists, more often than not, intuitively determine these amounts by orienting themselves on previously established amounts, or on the dynamics of developments themselves. The solution of this important problem requires the development of new principles of direction. Until recently, standardized principles in the acutal planning and financing of STP have not been extensively applied. In the 11th Five-Year Plan, the food industry shifted over to standardized principles of planning and financing its STP; i.e., the resources of the combined fund for scientific and technological development were distributed throughout the union republics, industrial branches, scientific-research and technical-engineering oprganizations, as well as to sectors of STP, on the basis of formulated norms which have approximately 6,000 standardized indices. These indices reflect optimal specific requirements and the effectiveness of expenditures on scientific-research and experimental design work during the years of the current five-year plan. The formulation of standards is also being worked out for the 12th Five-Year Plan.

On the basis of standardized principles for planning and financing STP, specific values with regard to requirements for republics and industrial branches to draw resources from the combined fund for scientific and technological development are being established for increasing basic volume indices in industry (commodity output, profit, economic effect, etc.); an optimal level of effectiveness in the utilization of resources from the combined fund for scientific and technological development (yield) in the direction of STP and its goals is being regulated; an optimal level of scientific achievement application in industrial branches and subbranches, republics, and regions is being determined, and a systematic leveling out of the technical level of their production by way of a change in the degreee of the concentration of their resources is also being achieved; a substantial immediate savings (up to 15 percent and more) of the resources of the combined fund for scientific and technological development is being guaranteed (this permits the formation of reserve funds for the supplemental financing of immediate industrial branches and areas of conern with regard to the most important scientific-technical programs and a guarantee of overall major impact); finally, a reduction (of up to 50 percent and more) is being achieved in the intensity of labor in planned estimates along with an increase in their reliability.

The shift in the food industry to standardized planning and financing of STP (i.e.; the optimal distribution and utilization of resources from the combined fund for scientific and technological development) has permitted an annual formation (of up to 5 million rubles) of reserve funds for the supplemental financing of highly efficient sectors of STP. Two different approaches with regard to the formation of standards in the determination of expenditures on scientific research and experimental design work are clear. The first approach consists of the determination of cost effectiveness with regard to the actual technical level of production and the rates of its increase as planned. This approach takes into account that the costs of scientific research and experimental design work influence the indices of effectiveness through the intermediate links, which are the indices of the scientific-technical and organizational level of production, and the indices of the labor, material, and financial resource consumption requirements associated with them.

Basic Schematic of the Interdependence of Expenditures on Scientifc Research and Experimental Design Work and its Levels of Effectivenss



The second approach requires the establishment of a mechanism for financing scientific research and experimental design work on the basis of an integral evaluation of those factors which influence the amount of expenditure, as well as by way of a specific commensuration of expenditure and the resulting changes in their indices of economic production effectiveness. A multi-factor evaluation of specific requirements in expenditures on the basis of an economic-mathematical mechanism presents the opportunity to set up a direct link between a single ruble of costs on scientific research and experimental design work and a specific increase in any index of volume in industrial production.

Along with the concept of financial resources for STP, we have to include the resources of the combined fund for scientific-technological development, as well as a part of a branch's capital investments earmarked for the acquisition (through experimental-industrial control) and application of scientific research and experimenal design work results in that branch's production. The best distribution of resources from the combined fund for scientific and technological development is based on the development of norms which regulate the specific scientific achievement application of investments in the expansion of STP in an industrial brank or region through individual sectors of STP and through the subsequent utilization of their results as the objective basis for planning and forecasting other results in scientific-technical progress.

With regard to the indices of effectivness of expenditures for the acceleration of STP in its standardized planning and financing, such indices as the growth of pure production over a single ruble of investment, the size of the annual economic impact on each ruble of cost, the prevention of a reduction in the prime cost as a result of the application of innovation for each ruble of cost, and the savings in terms of manpower expenditure as a result of scientific achievement application for each ruble of cost have been adopted. As a consequence, these indices are standardized indices for the various levels of STP direction and control.

An overall index which characterizes the economic result of introducing new equipment is the index of growth in pure production on the part of industrial branches and subbranches. Every four indices of cost effectiveness for the acceleration of STP are figured in for every sector of STP. In order to transform them into norms, a selection of an entire system of objective factors, determining the level of cost effectiveness, is conducted, and mathematical models, quantitatively characterizing multi-factor depepdency, are worked out. A number of parameters in the development of an industrial branch and its scientific achievement applicated are also regarded as objective factors.

Three basic groups of factors, which determine the level of the effectiveness of resource investments in science, are recognized: those of a scientific-technical level, those of an organization level of production, and those having to do with economic factors which characterize the capacity and level of scientific potential. The list of given factors can be changed depending on the peculiarities of this, or that, industrial branch or republic.

Factors are selected in two phases: first by means of logical analysis, then on the basis of correlational-regressive anaylysis of the mutual links between the indices of effectiveness and those factors selected already during the first phase. This multi-factor, correlational-regressive analysis is conducted by every industrial branch, republic, subbranch, and in the most important sectors of STP. For example, in the sugar industry of Byelorussia, the regressive equation in the sector of "progressive technology" looks like this:

$$y=1.62-0.84x_1-0.003x_2-5.57x_3-0.62x_4-0.35x_5,$$

where:
y = the growth of commodity production at the expense of introducing new equipment;
x_1 = production fund consumption;
x_2 = the degree to which basic production workers work with machines;
x_3 = production labor consumption;
x_4 = production material consumption;
x_5 = expenditures on STP for an increase of 1,000 rubles of commodity output (scientific achievement application).

The resulting system of regressive equations is the basis for the calculation of standardized indices of investment effectiveness in the acceleration of

STP; as the basis of the distribution of the resources of the combined fund for scientific and technological development, a norm for scientific achievement application in an industrial branch or subbranch was adotped; This norm is regarded as a relation of the costs to accelerate STP to the annual volume of commodity output. Resources for the acceleration of STP for the upcoming year are being distributed throughout industrial branches and subbranches on the equitable basis of scientific achievement application. Overall, each branch and subbranch of an industry will receive resources carefully calculated for it.

The formation of a standardized base for the direction and control of STP on the level of an industrial branch is being implemented by way of determination of a standardized capacity to apply scientific achievements and by way of norms for the efficient investment of resources in industrial subbranches and sectors of STP. In a similar manner, a standardized base can be built for the optimum distribution of capital investment according to industrial branches and subbranches, and sectors of STP, as well as for financing branches of scientific research organization.

The importance of such an approach also presupposes that the role of financial-economic levels in the direction and control of STP is substantially enhanced. Additionally, expenditures on the acceleration of STP are closely linked to the final results of industrial production, something which is influenced by the application of new technology. The guaranteed growth of economic effectiveness is a condition for the supplemental volume of scientific research and experimental design work financing. In addition to having at our disposal the norms for utilizing the scientific capacity of industrial branches, subbranches and regions, as well as having the norms for required expenditures for effectiveness, we have a mechanism for the possible inner-branch redistribution of resources for the acceleration of STP.

Both the utilization of calculators and computers in the building of a norms data base for the optimum planning and financing of STP and the many years of experience in testing the given approach in the food industry have confirmed the correctness and validity of the adopted methodology. We can cite the Byelorussian SSR as an example of the great effectiveness of standardized principles in the planning and financing of STP on the best possible basis. The distribution of resources for the acceleration of STP, based on standardized methodology - in contrast to traditional methodology, facilitated the enhancement of the overall level of annual economic statistics from 2.4 million rubles in 1982 to 4.13 million rubles in 1985, a 69 percent increase. The utilization of standardized principles in financing STP provides the opportunity for the rational regulation of the conditions necessary for its proper acceleration.

The application of standardized principles in STP financing intensifies the role of financial resources. Resources are concentrated in those sectors of STP which ensure a high return for investments; branch scientific-technical potential evens out along levels of standardized deductions for scientific research and experimental design work. This is possible only if the afore-mentioned principles are in application. Research into the ways of enhancing the effectiveness of scientific development confirms the need to conduct a comprehensive analysis of the dynamics of the process "development-application" in combination with a system of their support with additional scientific support.

As an example of the evaluation of the effectivenss of scientific developments and the methods of accelerating STP overall in the country's food industry, let us take a look at the optimalization of ah increase in overall profit from the application of all measures associated with new technology which has cost most than 1,000 rubles to introduce. The results of analysis showed that the greatest supplemental profit is ensured by expenditures on scientific research and experimental design work in such sectors of STP as new kinds of production (4.96 rubles for every ruble of overall cost), computer equipment (1.48 rubles), progressive technology and mechanization (2.8 rubles), and the modernization of production (1.38 rubles.).

The optimal utilization of the principles of plaaned distribution of costs for scientific research and experimental design work in the basic sectors of STP on a standardized basis ensures an enhancement of profitableness with regard to costs (capital investments) of 8 to 10 percent. Thus, the profitableness of costs, directed according to the method of optimized distribution on computer equipment, increased by 20 percent (from 107 percent in 1981 to 127 percent in 1983). In the sector overall, modernization of production increased by 9 percent (from 24 percent in 1981 to 33 percent in 1983), progressive technology and mechanization increased by 10 percent (from 63 to 73 percent and from 25 to 35 percent respectively). Profitableness, however, in the sector of new types of production has virtually failed to grow, inasmuch as the basic reserves for further growth in profitableness have been exhausted because of utilization in other sectors.

Major indices of effectivenss in such secotrs of STP of the food industry, like the new types of production, are rather consistent (in 1979 - 2.15 for every ruble of cost, 1980 - 4.7 rubles, 1981 - 4.7 rubles, 1982 - 4.92, and 1983 - 4.96 rubles). Additionally, in recent years the effectiveness achieved in the computer equipment sector has also grown significantly (in 1979 - 0.06 rubles for every ruble of cost, 1980 - 0.12 rubles, 1981 - 1.18 rubles, 1982 - 1.28 rubles, and 1983 - 1.48 rubles). This is explained by the fact that the resources invested in computer equipment in previous years began to produce a return. In the remaining sectors of STP, cost effectivness in the past two to three years has either decreased, or significantly increased. The point is that the canning industry, possessing considerable specific influence in the expenditure on scientific research and experimental design work, became a separate industrial branch; this reduced the overall expenditure and its yield with regard to new equipment introduction.

Analysis has shown that workers can be released from the food industry in proportion to the amount of STP expenditures; such measures, like mechanization, can provide for the release of workers (8 people for every 100,000 rubles), or modernization of production (5 people for every 100,000 rubles). This approach permits a better grounded distribution of expenditures on scientific research and experimental design work in the sectors of STP with prioritized sectors already determined.

Overall, the food industry has experienced a considerable improvement in recent years in the utilization of funds from the combined fund for scientific and technological development. There has also been a substantial increase in the

number of new technology applications, introduced in production, especially in such sectors of STP as progressive technology, mechanization of production, new types of raw materials and products , automation, and others. An analysis of scientific applications to industrial branches and the union republics permits a systematic leveling out of the technical level of their production at the expense of internal redistribution, as well as on the basis of supplemental financing from those reserve funds currently being set up.

We need to highlight here one more important point with regard to the standardized method of financial planning of STP. Possessing the specific values of the necessary costs for scientific research and experimental design work for a single ruble of increase in profits on the basis of developing various sectors of STP in such leading industrial branches as bread baking, sugar, sweets, butter and lard, beer and non-alcoholic beverage, and others, we have the possibility already today to set up a system of priorities for technical progress in the 12th Five-Year Plan. At the same time, prerequisites are also being established for the efficient control of financial resources during this period. Thus, with the aid of standardized methods, it we concluded that for each ruble spent in 1985 on scientific research and experimental design work, profits would increase as a result of the introduction of new technology by 3.2 rubles in the sugar industry, 1.2 rubles in the butter and lard industry, and 1.5 rubles in the beer and non-alcoholic beverage industry; with regard to new types of equipment, the profits were 13.05, 9.46 and 1.44 rubles respectively.

An analogous standardized evaluation of the active role of specific values of expenditures on scientific research and experimental design work is being accomplished in the basic sectors of STP throughout the union republics. The most complicated and simultaneously least researched sector in the development of standardized methods of STP financial planning is linked to the activity of the industrial branches of institutes and scientific-production associations. Further development of the standardized principles in the system of STP financial planning (on all levels of its direction and control) my be an important factor in its acceleration.

In June 1985 a conference of the party Central Committee met to discuss issues concerning the acceleration of scientific-technical progress. M.S. Gorbachev especially emphasized in his report that "it was necessary to shift in planning to standardized methods both in determining expenditures and in deciding tasks with regard to effectiveness and the satisfying of social needs. At the same time, the correct relationship between administrative and economic methods of management will be found."

The strengthening of association, enterprise and, overall, industrial branch responsibility with regard tothe enhancement of the technical level of production and its effectiveness results in the need to expand substantially the parameters of and rights for using the fund for production development; we must also expand the combined fund for scinetific and technological development, the amortization fund, and credit. The solution of these problems will be facilitated by an integrated regulation of the norms within the system of financially planning for STP, as well as by evaluating the effectiveness of its most important sectors. This particularly will be the center of focus of

the food industry, which, as one of the first in the national economy, has begun to utilize extensively program-objective and standardized methods of directing and controlling STP.

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FACILITIES AND MANPOWER

ACADEMY OF SCIENCES' LASER CENTER OPENS IN SHATURA

Moscow IZVESTIYA in Russian 22 Feb 86 p 2

[Article by K. Smirnov: "The Beam Is Operating. The Pilot Industrial Base of the Laser Center of the USSR Academy of Sciences Has Been Opened in Shatura"; first paragraph is IZVESTIYA introduction]

[Text] This we know from history textbooks: the Shatura Electric Power Plant is the firstling of the State Commission for the Electrification of Russia. But the lively history of our days is making eloquent additions to textbooks and the chronicles of cities. If the new sector--the laser industry--is firmly established in the economy of the country (and according to some forecasts, by the end of the century this awaits us), they will very likely call Shatura its cradle. On the eve of the 27th Party Congress, on 21 February, the scientific experimental and pilot industrial base of the laser center of the USSR Academy of Sciences was opened here.

Great hopes are being placed on technological lasers, when it is a question of the acceleration of scientific and technical progress. Today they cut metal, "work" as welders, and machine the surfaces of various materials. And they do all this three-, five-, or else tenfold more rapidly than in case of traditional technologies. And with excellent quality. With a large saving of raw materials. While increasing labor productivity significantly in the most different sectors.

At the Moscow Motor Vehicle Works imeni I.A. Likhachev, for example, the surface machining of the head of a cylinder block with a laser beam increases by three- to fourfold its durability, frees considerable time, which was spent on the production of additional heads, and saves metal. How was it earlier? If a small section is damaged at the place where the exhaust gases escape, the entire quite heavy part has to be thrown out. But now its life has been lengthened considerably. Owing to the laser.

A general-purpose tool with a wide range of various uses has been offered to the national economy. But so that lasers would actually blend with production, it is necessary not only to adapt them to the technology of the enterprise. It is also necessary to adapt the very technology to lasers and to develop fundamentally new production processes, in which laser units, robotics, and computers have been united in a single unit.

When in 1954 the first masers (quantum-mechanical generators which emit radio waves) of Basov, Prokhorov, and Townes appeared and in 1960 the first laser appeared, it seemed their industrial application was not far off. However, the "laser euphoria" quickly vanished. It turned out that the path from the laboratory unit to the industrial technological laser was no less lengthy and thorny than the path from the discovery by Einstein of the effect of induced radiation to its use in the first quantum-mechanical generators. But all the same, if we look at how this problem was solved by science and industry of our country, by today we should have gone much farther along this path than it has turned out in reality. What got in the way?

One of the reasons is: the laser beam had to wander a good deal in departmental labyrinths, about which IZVESTIYA, which took under its patronage the program on the introduction of technological lasers, at one time wrote repeatedly (one of our publications was named as follows: "The Laser Beam in Departmental Labyrinths").

For the fulfillment of this program it was necessary to establish a significant experimental technological base. Which is also being implemented in the idea of the Scientific Research Center for Technological Lasers of the USSR Academy of Sciences. Today the Technological Lasers Intersectorial Scientific and Technical Complex, to which, in addition to the center itself, which is the main organization, another seven enterprises and scientific and design organizations of the Ministry of the Electrical Equipment Industry belong, has been established on its basis.

The complex is working on the specific problem of how to turn over more quickly this new, truly revolutionary technology to the national economy. But there is also a logic of its own in the fact that various research collectives in various places of the country are coming to scientific production complexes, engineering centers, and so on and that these ideas have something in common. The basic components (no matter by what different names they are called), which are necessary for the practical implementation of a scientific idea, are incorporated in all such instances. This is science. This is engineering and design work. And this is production.

Many readers in their letters ask the question: Specifically when will the commercial production of technological lasers begin in the country? Their large-scale introduction is planned during the current five-year plan. The assimilation of the base in Shatura and the development of capacities in the electrical equipment sector will make it possible already in the next 2 years to begin the production of laser equipment for the national economy.

On the eve of the 27th CPSU Congress a mockup of the first industrial technological laser was started up in Shatura. This is the claim for the laser, which satisfies all the demands which industry is making on it--with respect to the quality of radiation, the life, the reliability, and other parameters.

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FACILITIES AND MANPOWER

AUTOMATION, RENOVATION OF USSR STATE LIBRARY

Moscow SOVETSKAYA ROSSIYA in Russian 28 Jan 86 p 4

[Article by A. Dyatlov: "The Book, the Laser, and the Computer. An Automated System Has Been Put Into Operation at the USSR State Library imeni V.I. Lenin"]

[Text] If on earth there was a Book Continent, the Library imeni Lenin would be one of its largest capitals. More then 34 million units of storage--from the rarest ancient manuscripts to books, sheet music, journals, and newspapers, which have just come from the printing plants of the world--that is the treasure of its repositories.

But, when laying the foundations in the 1940's of the new building of the library, the architects did not anticipate that already today it would become crowded for readers and for books. And that with time a compass, which would lead the reader to the goal more rapidly than the customary system of catalogs, would be needed in this enormous "sea" of books. In 1985 the decision was made on the general renovation of the Library imeni Lenin.

"The renovation is called upon to make the most abundant holdings of the library accessible to readers of not only Moscow, but also other cities," A. Vostrikov, chief of the automation department, relates. "The automatic system is the first step toward this."

We went up to a small display, on the screen of which the electron beam carefully wrote out line after line: the title of the book, its imprint, number....

"It is the operators who are processing the books which arrived here today," Vostrikov explained. "Previously all publications, which were sent from the Book Chamber, before getting to the reader, traveled among the departments of the library until they had drawn up for each of them a hand-written 'passport,' and then a card for the card file. Very much time was spent on this, since each department entered in the 'passport' its own data on the book." In short, readers waited for each new item "in addition" another 1.5-2 months. Now all the data on new books go into the computer memory. For example, it was necessary to publish a bibliography of new publications devoted to "Slovo o polku Igoreve" [The Tale of Igor's Campaign]. Just recently all the books needed for this had to be withdrawn from the

collections for a while and reprocessed. Now it is sufficient to address the electronic "bank," and the computer prints out the necessary data. It is also convenient for the readers: the new books in case of such processing get to the reading rooms in just 14 days.

"In 14 days at most!" Vostrikov emphasized. "Moreover, in the department of dissertations in a matter of seconds the computer suggests to the readers, whether the necessary manuscript or book has been borrowed, and if it has been borrowed, by whom and approximately when it will be available. This, after all, is also a saving of working time."

Along with the first section of the automated system the Soyuzkultura system, which helps to get one's bearing in the flow of information on culture, art, the circus, and the stage, has also begun to operate.

"We believe that the renovation of the library will help us to improve and expand the use of the computer in librarianship," A. Volik, deputy director of the library, said.

"Is it possible to speak in more detail about the renovation itself?"

"Of course. Not far from the old building of the library two more buildings will be built. In one the technical services will be located and workshops for the restoration of books will be opened. In the other there will be specialized departments: the sheet music, cartography, and manuscript departments. A new repository for 10 million units of storage will be fitted out on the lower floors."

"And what will the readers obtain?"

"Much. First, during the renovation we are incorporating possibilities for the more extensive use of microfilms and will install new copying equipment. Along with the use of the computer for the retrieval and selection of the needed texts, documents, and information this will make the work of readers significantly easier and will help to use the new acquisitions better. Moreover, there is the idea of creating an experimental department, in which full text documents will be stored on practically permanent optical discs. The method of 'recording' information with the aid of a laser beam is being used here. Moreover, now along with the largest libraries of the country we are working on the development of a unified library information system: then the collections of all libraries will become as if common and accessible to any resident of the country."

"Obviously, the appearance of the library will change during the renovation."

"By no means. The old buildings (including the famous House of Pashkov, which has become the symbol of the library) will be restored and renovated. Moreover, we will not close the doors of the reading rooms for a single day: the renovation should not hinder meetings with books."

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FACILITIES AND MANPOWER

LEGAL VIEW OF ORGANIZATION OF UKRAINIAN ENGINEERING CENTERS

Moscow KHOZYAYSTVO I PRAVO in Russian No 12, Dec 85 pp 25-27

[Article by Doctor of Juridical Sciences A. Podoprigora, professor of Kiev State University, under the rubric "For the Acceleration of Scientific and Technical Progress": "Engineering Centers. A New Legal Form of the Integration of Science and Production"]

[Text] The most important tasks of the acceleration of scientific and technical progress are the integration of science and production and the assurance of the interest of labor collectives and all the units of the national economy in the increase of the efficiency of work and the improvement of the quality of the output being produced. The decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1985 "On the Extensive Dissemination of New Methods of Management and the Increase of Their Influence on the Acceleration of Scientific and Technical Progress," in particular, is aimed at their accomplishment. At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress much attention was devoted to the improvement of the organizational and economic forms of the integration of science, technology, and production.

Positive experience in the area of speeding up the introduction of developments has been gained in the system of the Ukrainian SSR Academy of Sciences. Councils for the promotion of scientific and technical progress have been established in all the oblast, city, and rayon party committees. Such a council has also been established under the Ukrainian CP Central Committee. One of its basic tasks is the promotion of the organization of the efficient and quick use of scientific and technical achievements and the technical updating of production in the republic.

For the purpose of improving the structure of the management of scientific and technical progress several large institutes of the Ukrainian SSR Academy of Sciences have been transformed into scientific and technical complexes (NTK's). The experience of their activity has shown the unmistakable advantage of such an organizational, structural, economic, and legal form. They contribute to a significantly greater degree to the conducting of goal-oriented basic research, bringing its results up to a high degree of readiness for large-scale introduction.

However, practice required the further improvement of the integration of science and production. Now the degree of readiness of new equipment should be such, that it would be possible to quickly introduce it in many sectors of the national economy. Therefore, the need arose for special organizational forms, which are in keeping with the complexity and scale of the tasks of introduction and ensure the engineering and technical embodiment of innovative achievements. Such problem-oriented formations received the name of engineering centers. (Footnote 1) (See B.Ye. Paton, "Engineering Centers," PRAVDA, 3 January 1985)

At the Ukrainian SSR Academy of Sciences eight engineering centers, which are engaged in the solution of various problems, are in operation. They are established and eliminated by a decree of the Presidium of the Ukrainian SSR Academy of Sciences on the representation of the scientific and technical complex and in consultation with the corresponding department of sciences of the Ukrainian SSR Academy of Sciences. The Presidium of the Ukrainian SSR Academy of Sciences approves the Statute on the Engineering Center, which specifies its status. For example, according to the statute, which was approved by the decree of the Presidium of the Ukrainian SSR Academy of Sciences of 25 February 1985, the engineering and technical center of strengthening and protective coatings (UTTs UZP) (Footnote 2) (This specific subdivision is called an "engineering and technical center," the others are called "engineering centers") is a structural unit of the cost accounting experimental design and technological bureau (OKTB) of the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences. (Footnote 3) (Not all engineering centers are structural subdivisions of experimental design and technological bureaus. They can also be structural subdivisions of other specialized divisions or pilot works) It is called upon to contribute in every possible way to the shortening of the cycle of the introduction of developments in the national economy and to ensure the typification and unification of design decisions and the training and advanced training of specialists for industrial enterprises. The corresponding divisions of the experimental design and technological bureau of the institute, shops of coatings, the scientific and technical bureau, the group for information and the analysis of developments on coating processes, and the group for the training and advanced training of specialists in coatings for industry belong to the engineering and technical center of strengthening and protective coatings. Temporary subdivisions of the center can be established for the fulfillment of individual assignments.

Several peculiarities exist in the management of engineering centers. The chief of the corresponding department of the institute carries out the scientific supervision. However, the scientific supervisor is freed from the day-to-day management of the center. The director and his deputies carry out administration and management, the settlement of current questions, and the monitoring of the activity of the engineering center.

The scientific supervisor and director of the engineering center are approved by a decree of the Presidium of the Ukrainian SSR Academy of Sciences on the representation of the board of directors of the scientific and technical complex, which has been approved by the Physical and Technical Problems of Materials Science Department of the Ukrainian SSR Academy of Sciences. The

director of the engineering center is at the same time a deputy chief of the experimental design and technological bureau of the institute.

A manager, who is approved by the board of directors of the scientific and technical complex, is in charge of each permanent structural subdivision of the engineering center. The manager of a temporary subdivision is appointed for the time of the fulfillment of assignments.

A scientific and technical council, (Footnote 4) (An engineering and technical council has been established in the engineering and technical center of strengthening and protective coatings) the personnel of which are approved by the director of the scientific and technical complex, is set up in the engineering center for the settlement of questions connected with scientific activity. The deputy director of the institute for scientific work is the chairman of the council, the scientific supervisor and director of the institute are the deputy chairmen. The managers of the subdivisions, the leading scientists and specialists, as well as representatives of the party and trade union organizations of the center are also members of the council. The council examines the themes and plans of work of the center; discusses the questions connected with the change of its organizational structure; discusses and approves the reports of the managers of the subdivisions.

For the performance of scientific and technical work the engineering centers jointly with the corresponding departments of the institute draft a unified thematic plan with the reflection of all the stages of the work--from the origination of the idea to its embodiment in practice. The themes and plans are accepted by the scientific and technical council only if all the necessary resources for the performance of the work--manpower, material and technical, financial, and so on--are available. All the decrees of the scientific and technical council are legalized and put into effect by orders of the director of the center.

The scientific research, engineering, and technical personnel, who are attached to the center, are subordinate organizationally to its director, while remaining subordinate administratively to the organization which sent them. The attached personnel are obliged to perform work in accordance with the approved schedule and to observe the labor regulations of the engineering center. The staff members of the permanent subdivisions of the engineering centers enjoy the rights of workers of the scientific and technical complexes of the Ukrainian SSR Academy of Sciences.

The engineering center in matters of the planning of experimental design, engineering, and technological development, the introduction of new types of machines, equipment, and materials, as well as the instruction and advanced training of specialists is accountable to the scientific and technical complex and the scientific supervisor of the center. The center is responsible for administrative, management, technical, and financial activity to the experimental design and technological bureau of the institute, of which it is a subdivision.

In its engineering and technical activity the center has occasion to enter into economic and legal relations with many production associations and

enterprises of various ministries and departments. They act as clients of its products or producers of the necessary latest production equipment and materials. However, the engineering center is not the subject of economic and legal relations, since in conformity with the statute it is not a legal entity. The experimental design and technological bureau of the institute performs these functions.

The experimental design and technological bureau of the institute carries out the material, technical, and financial supply of the engineering centers. The financing, manning, accounting, and other administrative, economic, and legal functions of the engineering centers are indicated by a separate line by the corresponding services of the scientific and technical complexes.

The engineering centers have their own separate wage fund and bonus fund. The director establishes the salaries and amounts of the bonuses for the staff members of the center within the limits of the available funds in accordance with the manning table. They correspond to the salaries and funds, which have been established at the pilot plant and in the experimental design and technological bureau. The manning table and salaries are approved by the director of the scientific and technical complex on the representation of the management of the center.

The material base of the engineering centers is formed by means of the assets and resources of the subdivisions of the experimental design and technological bureau and the pilot plants of the scientific and technical complexes, which are a part of it. The acquisition of new materials and other material and technical resources and the replenishment of the spent assets are carried out by the same organizations of the scientific and technical complexes in accordance with the order of the director of the center.

An advantage of the legal regulation of engineering centers is the fact that the statutes on them clearly specify their internal economic and legal relations with institutes and experimental design and technological bureaus. The rights and duties of institutes and experimental design and technological bureaus with respect to the engineering centers are specified in the statutes. Thus, the institutes and their experimental design and technological bureaus have the right to demand of the engineering centers information and reporting documents on their activity in conformity with the approved plans and deadlines. They ensure the proper use of the material, technical, and financial assets, as well as their replenishment, and carry out the monitoring of the activity of the centers. The institutes and their design and technological bureaus submit the necessary documents and information on the work of the engineering centers to superior organizations.

The institutes and their design and technological bureaus also carry out the administrative and management support of the engineering centers.

The conclusion of contracts with other organizations and representation in superior organs and public organizations are entrusted to the institutes and design and technological bureaus.

Such are the basic principles which determine the status of the engineering centers. Their practical activity has enabled the institutions of the Ukrainian SSR Academy of Sciences to concentrate the efforts of leading scientists on long-range problems. The selected method of planning the entire cycle of work from research to introduction, day-to-day management, and the appropriate material and technical supply in the presence of a well-developed network of scientific, technical, and production relations are enabling the engineering centers to successfully perform goal-oriented basic research, to increase the technical and economic level of developments, and to ensure their large-scale introduction.

At the same time a number of organizational, legal, economic, and other problems have gotten in the way of the further expansion and development of the engineering centers. Their solution goes beyond the competence of the Ukrainian SSR Academy of Sciences. It is advisable, in our opinion, on a statewide scale to specify the legal status of the engineering centers and to establish a reliable legal organization of material and technical supply, financing, economic stimulation, and material incentives.

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AUTOMATION AND INFORMATION POLICY

DEVELOPMENT OF AUTOMATED SYSTEMS FOR PLANNING CALCULATIONS

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian Vol 21, No 6, Nov-Dec 85 (manuscript received 14 May 85) pp 966-977

[Article by V.B. Bezrukov under the rubric "Theoretical and Methodological Problems" (Moscow): "The Basic Directors of the Development of Automated Systems for Planning Calculations"; passages within slantlines published in italics]

[Text] 1. THE METHODOLOGICAL PRINCIPLES OF FORMING AND DEVELOPING AUTOMATED SYSTEMS FOR PLANNING CALUCLATIONS

The realization of the most important directions of the improvement of the planned management of the economy is being accompanied by the broadening of the group of problems and the increase of the amount of work and calculations, which are connected with the drafting of state plans. Under these conditions their high-quality and timely preparation cannot be ensured on the basis of the established methods and technology of planning and its technical base. The formation of automated systems, which make it possible to increase the scientific level of planning and management, is one of the means of their further development.

The necessary prerequisites for this were created in our country back in the 1960's. A large number of mathematical economic models were developed and checked experimental, on the basis of the use of mathematical methods and electronic computer technology the first intersectorial accounting and planning balances were created, individual problems of the optimization of the development and distribution of production and others were solved.

These successes gave rise to the belief in the speed and ease of the transformation into a reality of the potential of the mass use of mathematical economic models in planning. Meanwhile from the prototype to industrial technology there is a very long distance, the covering of which in a number of instances requires the substantial refinement of the version of the model, which was checked in the laboratory, the surmounting of the so-called psychological barrier, and the creation of the necessary economic organizational prerequisites for the extensive use of the innovation in the practice of planning. It is not by chance, therefore, that the attempts at copying even the prototypes of models that had given a good account of

themselves in the experiment, which were not backed by a set of operations on their effective introduction, did not yield the desired results.

Experience showed that the revision of the scientific, technical, and information base of planning and of its technology and organization is required for the improvement of planning on the basis of advanced methods and means of information processing. Obviously, the content, sequence, and forms of such revision need thorough theoretical substantiation and the implementation of well thought out measures--both organizational and technical measures and measures connected with the training, advanced training, and improvement of the skills of staffs of planning workers. In conformity with the systems approach all these measures should have a clear ultimate goal, be interconnected and separated in time, be backed with resources, and be implemented in accordance with a common plan under the supervision and control of a single center. The designing and introduction of the automated system for planning calculations (ASPR) of the USSR State Planning Committee, the state planning committees of the union republics, and local planning organs were a specific form of the implementation of such an approach.

The automated system for planning calculations is designed for the making within a given time of multivariant calculations of the drafts of state plans within their unified system, with the complex coordination of each version and the optimization of the solutions and includes all planning calculations, a set of models, algorithms, and programs for the computer, information, and the paper flow, as well as the means of computer technology, office automation facilities, and communications, which are used when drawing up the plans [1, pp 33-44].

The system unites the processes of the drafting of the plans and the monitoring of their fulfillment at the national economic, sectorial, and territorial levels.

The methodology of socialist planning acts as the initial and decisive component of the automated system for planning calculations. At the same time the choice of the methods, used information, and technology of planning are directly dependent on the computer hardware and office automation facilities, which are used by planning organs. Therefore, the formation of the automated system for planning calculations is not the act of the establishment of some fundamentally new system which replaces the existing one; it should be regarded as the continuous improvement of the prevailing system of planning by the comprehensive development of its procedural, information, and computing basis.

In the procedural respect in the process of creating the automated system for planning calculations there are envisaged: the development of an interconnected system of the preparation of long-range (long-term and five-year) and annual state plans, the improvement of the unified system of balance sheet calculations, the development of methods of coordinating the sectorial, territorial, and program cross sections of the plans and of means of coordinating plans of different durations and the sections and cross sections of the plans within each of them and with each other, the introduction of methods of optimizing planning decisions during the compilation of the plans,

and the improvement of the set of indicators of the plan with allowance made for the combination of measures on the further consolidation of planned management with the broadening of the rights, responsibility, and initiative of enterprises and associations.

As an information system the automated system for planning calculations is called upon to ensure the acquisition, storage, updating, retrieval, and issuing of data which are used in the process of drafting the State Plan and monitoring its fulfillment, which will make it possible to increase the scientific soundness of planning calculations, to create the conditions for their integration, and to meet the additional needs of specialists of planning organs for information.

As a computer system the automated system for planning calculations makes it possible to speed up significantly data processing procedures, which will decrease the labor intensiveness of the making of planning calculations, will increase their accuracy, and will enlarge the group of variant calculations in the process of drafting the plan.

The development of the automated system for planning calculations--a system which is unique in scale and complexity--requires the solution of an entire set of interconnected problems. The lack at the initial stage of experience in the designing and introduction of similar systems both in our country and abroad dictates the importance of the thorough study of the organizational principles of its formation. There should be a specific sequence: the stages of the scientific substantiation, predesign analysis, direct designing, and introduction of the system. However, in contrast to technical systems, for which the phases of designing, introduction, and use are clearly divided, for the automated system for planning calculations it does not seem possible to draw a line between the first two phases. In essence the designing of the automated system for planning calculations at the same time is also the transformation of the prevailing technology of planning by the stage-by-stage introduction in the process of drawing up state plans of mathematical economic methods and electronic computer technology.

As a consequence of the dynamic nature of the object of planning--the socialist national economy--and the adequate improvement of the theory and practice of drafting state plans, as well as due to the continuity of the development of the methods and hardware of information processing it is impossible to design and introduce the automated system for planning calculations as a completed system. Therefore, the sequence of the formation of the automated system for planning calculations in the form, in which it developed as a result of the gained experience, includes the /stages/ of development and the /phases/ of its introduction.

The /stage/ is the process of the transition of the system of planning as a whole to a qualitatively new level; it involves substantial changes in the method and technology of drafting state plans and monitoring their fulfillment by the use of mathematical economic methods and models, the use of computer technology, and the improvement of this basis of the method, technology, and organization of planning.

The /phase/ is a part of the system, which was developed for a specific period (a 5-year period), has been put into operation, is backed by systemwide methods and means, and is supplied with a complete set of design, acceptance, and operating documents.

At present two stages of the development of the automated system for planning calculations have been determined and substantiated [1, pp 52-54].

The first--/the automation of planning calculations/--is characterized by: the increase of the degree of balance and comprehensiveness of planning by the enlargement of the group of balances of material, manpower, and financial resources, production capacities, and capital investments, which are formulated with the use of a computer; the extensive use in planning calculations of the set of scientifically sound norms and standards, which are formed on the computer; the development of intrasubsystem and intersubsystem sets of economic planning problems; the multivariant study of planning projections and the local optimization of planning decisions; the freeing (for the most part) of planning workers from manual calculations and the drawing up of their results; the creation of the conditions for the prompt making of calculations for the drafts of current and long-range plans in conformity with the established procedure and periods; the development of the components of interaction with the automated control systems of ministries, departments, and union republics.

The second stage of the development of the automated system for planning calculations--/the integration of planning calculations/--in light of the present notions about the future of the system is characterized by: the development of a uniform automated technology of planning on the basis of the systems use of advanced methods of planning calculations and data processing equipment for the purpose of increasing the scientific soundness, balance, and effectiveness of national economic plans by the integration of the processes of drafting the sectorial, functional, and consolidated sections of the plan within the automated system for planning calculations and the organization of the interaction of the automated system for planning calculations with the automated control systems of ministries and departments and republic automated control systems.

In the end the level of development of the automated system for planning calculations at each stage depends on the supply with methods of planning, means of the organization of work with large arrays of economic information, mathematical programs, and methods of solving planning problems and the quality of the technical base of planning.

2. THE BASIC RESULTS OF DEVELOPING THE AUTOMATED SYSTEM FOR PLANNING CALCULATIONS

The USSR State Planning Committee and the state planning committees of the union republics began the development of the automated system for planning calculations about 20 years ago. During these year a large amount of scientific research and design work has been performed.

The development of the theoretical and design base of the system: the technical assignments on the formation of the automated system for planning calculations as a whole and of its functional and support subsystems at the level of the USSR State Planning Committee and the state planning committees of the union republics, Moscow and Leningrad, and local planning organs, was the most important thing in this area. In them an analysis of the traditional technology of drawing up the drafts of the plan was made and the basic goals and tasks of its improvement under the conditions of the extensive use of mathematical economic methods and electronic computer hardware were formulated. The conceptual design of the automated system for planning calculations was drafted and approved, the detail designs of the functional subsystems were prepared and approved.

In these documents with allowance made for the set of measures on the improvement of planning the flow chart of the planning process, which reflects the logic and sequence of the preparation of drafts of the state plans and the monitoring of their fulfillment, is cited, and their coordination with the diagrams of the functioning of the sectorial automated control systems of ministries and departments and the republic automated control systems, which interact with the automated system for planning calculations during the drafting of the plans, is also carried out in general form.

The diagrams and their description were compiled on the basis of the requirements of the improvement of the methods of planning for the purpose of developing a set of state plans of different duration (long-term, five-year, and annual), which is interconnected in all its parts. Within the conceptual design the fundamental problems of the development of the information support, hardware, software, and technological, manpower, organizational, and legal support of the process of drawing up the drafts of the state plans and monitoring their fulfillment were also examined and solved collectively [2, p 170].

As a whole the entire set of these documents contains a design "image" of the automated system for planning calculations and is a reliable foundation for the systems improvement of the technology of planning.

Much work has been performed in the area of the organization of the designing and introduction of the automated system for planning calculations. At present about 100 scientific research and design organizations of the USSR State Planning Committee, the state planning committees of the union republics, ministries, departments, and the USSR Academy of Sciences are taking part in the development of the automated system for planning calculations. Their activity is regulated by the coordinating plan of operations, which is approved for a 5-year period in accordance with established procedure. In it the list of basic assignments on the development of the automated system for planning calculations and the deadlines of their fulfillment during the given period are specified, and the necessary financial resources are also allocated. The work programs, in which the basic assignments are broken down with an indication of the performer and the time of introduction, are drawn up by the coperforming organizations. The work programs and proposals of the state planning committees of the union republics, Moscow, and Leningrad serve as the initial ones for the preparation

and approval by the USSR State Planning Committee of the annual plans of the introduction of the automated system for planning calculations. For the purpose of ensuring the unity of the formation of the entire set of planning documents the corresponding procedural materials, which specify the order, forms, and dates of their submitting to the main organization--the Main Computer Center of the USSR State Planning Committee--for subsequent examination, generalization, and approval in accordance with established procedure, have been drawn up. Working groups, which carry out the methods supervision of the designing and organization of the introduction of the functional subsystems of the automated system for planning calculations, have been set up in the USSR State Planning Committee and the state planning committees of the union republics.

For the purpose of increasing the personal responsibility for the quality of designing of the automated system for planning calculations as a whole and its subsystems the Chief Project Manager of the Automated System for Planning Calculations and the complement of his deputies and the leading managers for the designing and development of the functional subsystems have been appointed. For the coordination of the activity on the development of the automated system for planning calculations at the republic level the main union republics, which are responsible for comprehensive designing for the republics with an oblast division (the Ukrainian SSR) and without an oblast division (the Lithuanian SSR) and for the combined solution of the problems of the interaction of the automated system for planning calculations with the sectorial automated control systems of ministries and departments at the republic level (the Latvian SSR), have been approved. The complement of the leading managers of these operations at the republic level, as well as the republic working groups for the functional subsystems has been formed.

In evaluating the results as a whole, it is possible to conclude that the established organization makes it possible to ensure a specific level of responsibility and effectiveness in case of the designing and introduction of the automated system for planning calculations. Much has already been done in the area of the development of the technical base of planning and the technology of the processing of economic planning information on computer. At present the Main Computer Center of the USSR State Planning Committee and the computer centers in the state planning committees of the union republics and the city planning commissions of Moscow and Leningrad are equipped with modern means of the processing, transmission, storage, and representation of information on the basis of the Unified System of Computers.

By the end of the 11th Five-Year Plan several hundred Iskra-226 minicomputers, the production of which was organized by domestic industry on the initiative of the developers of the automated system for planning calculations, will be in operation directly in the departments of the USSR State Planning Committee, the state planning committees of the union republics, and the city planning commissions of Moscow and Leningrad.

A set of technological aids of the automated system for planning calculations, including effective packages of software and information and technological support, has been assimilated and is being constantly developed, which is making it possible today, first, to automate the processes of preparing data

with the use of high-speed computers like the SPD-9000, YeS-9003, and others; second, to store and update economic planning information under the conditions of a multicomputer data processing system, as well as in the interaction of the central computers of the Unified System with Iskra-226 minicomputers; third, to obtain economic planning information from the automated control systems of ministries and departments on magnetic tapes and, finally, fourth, to provide the planning worker a number of services during the solution by him of economic planning problems, including to use video terminals. All this made it possible at the given stage of the development of the automated system for planning calculations to carry out information processing in the batch mode with the complete use of all its technical possibilities.

Much work has also been done on legal and manpower support. Thus, statutes on the Main Computer Center of the USSR State Planning Committee, the computer centers of the state planning committees of the union republics, and their structural subdivisions have been drafted and have been approved in accordance with established procedure. Job instructions for various categories of specialists who work at them have been approved. Questions of the use of the automated system for planning calculations found reflection in the statutes on the USSR State Planning Committee, the state planning committees of the union republics, and their subdivisions.

Within the framework of manpower support at present curricula, syllabuses, and methods handbooks have been developed for the students who are studying in the Higher Economics Courses attached to the USSR State Planning Committee. The advanced training and improvement of the skills of a broad group of specialists of the USSR State Planning Committee and the state planning committees of the union republics have been carried out in conformity with these curricula, which has enabled planning workers to acquire the necessary knowledge and skills of the use in practice of the methods and means of the automated system for planning calculations.

The efficiency of the establishment of the automated system for planning calculations in many ways is governed by the elaboration and introduction of the economic planning problems, which are being solved by means of electronic computer hardware in the process of formulating drafts of the state plans of economic and social development.

In the decisions of the 26th CPSU Congress there was posed for the 11th Five-Year Plan the task "to introduce and to use efficiently the automated system for planning calculations" ["Materialy XXVI syezda KPSS" (Materials of the 26th CPSU Congress), Moscow, Politizdat, 1981, p 198]. For its accomplishment during the current five-year plan much work has been performed on the development of large computing and data processing complexes, among which are:

--the computing and data processing complex for calculations of the indicators of the plans of production, capital construction, and their supply with material and technical resources on the basis of a unified standard base--in the mode of annual planning;

--the central complex of problems for the substantiation of the basic indicators of USSR economic and social development and the solution of the most important problems of their balance--in the mode of five-year planning;

--the integrated complex of balance sheet calculations for the making of forecasting, analytical, and planning calculations for the purpose of the multivariant substantiation and interconnection of the indicators of consolidated economic and comprehensive goal programs and the development of intersectorial and territorial production complexes;

--the set of problems for the agroindustrial, fuel and energy, machine building, and construction complexes for the coordination of the calculations of the indicators of the corresponding sectorial current and long-range plans on a uniform information and procedural basis;

--the complex of calculations on the monitoring of the progress of the fulfillment of the plans for the purpose of preparing measures on the fulfillment of the plan assignments and the commitment to the economic turnover of the identified reserves and potentials.

Thus, in the USSR State Planning Committee in 1985 during the drawing up of the draft of the Basic Directions of Economic and Social Development for 1986-1990 and the Period to 2000 and the draft of the annual plan for 1986 more than 5,000 economic planning problems were solved within these complexes. It is possible to divide them procedurally into two classes: the problems of direct data processing and the problems which are solved with the use of mathematical economic models. The former make up about 80 percent of the total number of problems being solved in the automated system for planning calculations and are intended for the processing of enormous arrays of information, which come to the USSR State Planning Committee from ministries and departments during the formulation of the national economic plan. These problems make it possible to perform on computer consolidated calculations with respect to the various sections of the plan; to formulate material and other balances, the plans of distribution, and excerpts from them; to make calculations of the indicators of different sections of the plan; to prepare planning documents in accordance with the data which are stored in the computer during the making of the indicated calculations. The balance sheet calculations, which constitute the basis of the computing and data processing complex for the substantiation and interconnection of the indicators of the annual plans of production, capital construction, and their material and technical supply, are a typical example of problems of this class. These calculations encompass the formation of the standard base of the consumption of material resources and of the determination of the need for them (as well as the capital and the plans of distribution) and the formation of the corresponding analytical tables and the intermediate and final planning documents in a computer version. Calculations of the need for production and the repair and operating needs for rolled ferrous and nonferrous metal products, steel pipe, steel, iron, and nonferrous castings, hardware, natural and synthetic rubber, and several other resources were made during the drafting of the plan for 1986. The needs for material and technical resources for capital construction were also determined on the basis of the direct

processing of the data on construction projects, which made it possible to provide a significant saving of resources in capital construction.

The development of this work is oriented toward the introduction of a system which makes it possible to evaluate fully all the resource characteristics of the plan of capital construction (including the need for capacities of construction organizations).

At the end of the 11th Five-Year Plan calculations for all the basis types of raw materials, materials, fuel, and power, for which the USSR State Planning Committee elaborates material balances, will already have been made in accordance with the uniform technology.

The problems of direct data processing are also solved when drawing up the consolidated plan of the output of industrial products in physical and value terms, the consolidated plan of capital investments and the placement of fixed capital into operation, the consolidated plan on labor and personnel, the consolidated plan on the production cost and the profit, and the foreign trade plan, when formulating the indicators of a number of sectorial sections of the plan, and when carrying out the monitoring of the progress of the fulfillment of the annual plan.

Experience attests that the problems of this class make it possible to increase substantially the promptness and accuracy of planning calculations, to increase their qualitative level, and to use more extensively standard methods of planning for the purpose of improving the balance and efficiency of planning projections.

The problems of the second class make up about 20 percent of the total number of problems which are solved in the automated system for planning calculations. The model of the intersectorial balance of the production and distribution of products is typical among the matrix models being used in practice.

The consolidated (with a breakdown by 18 sectors of industry and the national economy) intersectorial value balance, which is used in calculations for the 5-year period and the long-range future, and the detailed (with a breakdown by the same 18 sectors, the basic industrial ministries, and the 250 most important products) intersectorial physical and value balance, which is used in calculations for the five-year and annual plans, have been formulated in the USSR State Planning Committee since the early 1970's. By means of the indicated models analytical calculations of the rate and proportions of the development of the national economy for the checking of various hypotheses of the planned dynamics of capital investments, the volume and structure of consumption of the population, and the efficiency of the use of resources in sectors (the materials-output ratio, capital-output ratio, and labor intensity of their products), as well as calculations for the checking the mutual balance of the suggestions of ministries and the sectorial departments of the State Planning Committee on the draft of the plan are made within the central complex of problems in the mode of five-year planning. They all ensure the multivariant nature of the substantiation of the consolidated economic indicators, the comprehensive evaluation of the influence on them of the

decisions being made with respect to the individual sections of the plan, and the closer connection of the balance of the national economy with the material balances and projections with respect to individual sectors and types of products [3].

Of the models of optimum planning the models of the optimization of the development, distribution, and specialization of production have become most widespread. Their solution for complexes of sectors, individual sectors, and types of production makes it possible to determine the best specialization of enterprises, and to selection from the possible versions of the renovation of operating facilities and the construction of new facilities the ones which meet the national economic needs with the least costs. In these problems in conformity with the general method the current capital and cumulative (production and transportation) expenditures, which have been reduced to a single moment of time, act as the minimizable expenditures.

Optimization models are also finding effective use in the formulation of the production program of the sector or subsector, the optimization of the use of production capacities, and the rationalization of transportation links. A typical example is the calculations on the optimization of the development of the fuel and energy complex of the country, the results of which were taking into account when preparing the Energy Program of the Soviet Union. Another example is the calculations on the optimization of the development and distribution of agricultural production among the union republics, which are making it possible to determine the composition, structure, and specialization of agricultural production in each of them, the structure of planted areas, the structure of fodder production and fodder consumption with allowance made for their balance sheet coordination, and the basic directions of the use of the capital investments and mineral fertilizers, which are being allocated to agriculture.

Optimization calculations are also being made with respect to such sectors and sectorial complexes as the cement industry, the repair of civilian deep-sea vessels, the food industry, chemistry and petrochemistry, the national economic timber complex, and others.

Along with matrix and optimization models in the automated system for planning calculations mathematical statistics models are also being used, for example, for the retrospective analysis of the trends forming in the national economy and the forecasting of indicators at the initial stage of the drafting of long-range plans. Thus, the use of the indicated models made it possible to analyze the dependence of the rate of socioeconomic development on the dynamics of the share of accumulation in the national income, to substantiate the possible means of increasing the average yield for the country of the leading grain crops subject to the predicted yield of these crops, and so forth.

Thus, the economic planning problems, which have already been assimilated in the automated system for planning calculations and are being realized on the basis of both the method of direct data processing and various mathematical economic models, encompass all the stages of the drafting of current and long-range plans.

Consequently, it is possible to infer the real possibility of changing over to a substantially more effective technology of the processing of economic planning information when drafting state plans as a result of the introduction of the second section of the automated system for planning calculations [4].

In conformity with this technology the bulk of the suggestions of ministries and departments on the drafts of plans should arrive at the USSR State Planning Committee (the republic state planning committees) on standardized forms and magnetic carriers and undergo primary processing on computer for the purpose of the formation for the departments of the State Planning Committee of information arrays for the making of analytical, consolidated, and other calculations during the consideration of these suggestions and the preparation and making of planning decisions. Further, on the basis of the indicated arrays it is necessary to make variant calculations on the interconnection, coordination, and balancing of the indicators. Here the user (planning worker) will obtain the opportunity to promptly make the required corrections in the information arrays during the making of the calculations and the preparation of planning decisions. At the final stage of the drawing up of drafts of the plans the output forms of the planning documents will be established on the basis of the information arrays which were formed in the process of the calculations.

In 1985 it is proposed for the most part to complete in practice the first stage of the development of the automated system for planning calculations. Today it is already clear that the methods and means of the automated system for planning calculations, which have been developed and introduced in the practice of planning, are ensuring an increase of the degree of balance and comprehensiveness of the plans, which are being drafted at the national economic level, the local optimization of planning calculations, the freeing mainly of planning workers from manual calculations and the drawing up of the obtained results, the shortening of the time of the making of planning calculations, and the provision of the conditions for the timely approval and delivery of these calculations to the performers. The achievement of these goals, in conformity with the conceptual design, precisely defines the first stage of the development of the automated system for planning calculations.

3. BASIC DIRECTIONS IN DEVELOPING THE AUTOMATED SYSTEM FOR PLANNING CALCULATIONS DURING THE 12TH FIVE-YEAR PLAN AND FOR THE PERIOD UP TO THE YEAR 2000

The second stage of the development of the automated system for planning calculations, as was already noted, is characterized by the integration of planning calculations, on the basis of which the improvement and increase of the efficiency of the technology of planning are envisaged, by relying, first, on the unified set of calculations of all types of plans with a breakdown by sectors, territories, and programs and, second, on the interaction of the automated system for planning calculations with other automated systems at the level of enterprises, union republics, ministries, and departments, which will contribute to the organization of the statewide system of the collection and processing of information for accounting, planning, and the management of the national economy (OGAS).

These goals dictate the basic directions of the development of the automated system for planning calculations during the 12th Five-Year Plan and the period to 2000. Their achievement will make it possible to accomplish the comprehensive improvement of the technology of planning by the systems use of advanced methods of planning calculations and means of data processing for the increase of the scientific soundness, balance, and efficiency of the drafts of national economic plans.

Consequently, the long-range goals of the development of the automated system for planning calculations are determined, on the one hand, by the needs of planning practice and, on the other, by the opportunities which are being afforded by scientific and technical progress in the area of the performance of planning work and means of the processing of economic information. The use here of the achievements of scientific and technical progress is a necessary condition for the development of a unified automated technology of planning, which is the ultimate goal of the development of the automated system for planning calculations for the future period to 2000. This technology encompasses the processes of: the drafting of state plans and the monitoring of the progress of their fulfillment; the information service of planning workers during the performance by them of current planning and operational work.

Such an approach conforms to the urgent problems of the improvement of planning at the present stage, takes into account the actually existing scientific, technical, and design reserve, and ensures continuity in the development of the system: from the automation of local calculations, then the complexes of interconnected problems to the automation of the technological processes of the drafting of individual sections of the plan and planning as a whole.

As is known, the processes of drafting state plans under the conditions of the automated system for planning calculations were improved by stages during the past three five-year plans and will be improved in the future with the introduction in planning practice of complexes of economic planning calculations. For this during the 12th Five-Year Plan it is necessary to solve a number of problems.

First, to carry out the intrasystem coordination of the problems of the sectorial subsystems on the basis of the formation of information-algorithmic connections between the calculations, which are included in the basic complex of problems of the sectorial plan (production, capital investments, material and technical supply, labor and personnel, the production cost and the profit) for the purpose of developing a technology of the drafting of the corresponding sectorial sections of the plan, having envisaged in this case their interaction with the sectorial automated control systems of ministries and departments.

Second, the formation of a technology of the drafting of the consolidated (balance and functional) sections of the plan on the basis of the organization of the interaction of the consolidated and functional subsystems of the automated system for planning calculations with the corresponding blocks of the sectorial subsystems of the automated system for planning calculations, as

well as with the automated control systems of functional departments (the State Committee for Material and Technical Supply, the State Committee for Labor and Social Problems, the State Committee for Prices, the Ministry of Finance, and so on) and the republic control systems (RASU's) should be ensured.

Third, it is necessary to continue the commenced work on the improvement of the technology of drafting annual and five-year plans. The improvement of the balance sheet and standard methods of planning by the enlargement of the group and the assurance of the interaction of the balance calculations and the calculations on the basis of standards should contribute in many ways to the solution of this problem. The centralized calculations of the need and distribution of material resources in the national economy on the basis of the development and introduction of forecasting models and a set of calculations of single-product, integrated, and interproduct physical and value material balances will undergo further development. For these purposes it is necessary to ensure the development of the collection of advanced norms of the consumption of resources, which should be carried out in conjunction with the automated calculations of the plans of organizational and technical measures on the saving of material resources.

Moreover, the extensive use in the practice of drafting the five-year plan of a set of intersectorial balances, which is interconnected with the complex of calculations of the indicators of production, capital construction, material and technical supply, labor and personnel, the sectors of the nonproduction sphere, and the social development and increase of the standard of living of the population, will play an important role in the framework of the introduction of the central complex of problems.

The increase within the automated system for planning calculations of the scientific level and soundness of the planning of capital construction by the introduction during the 12th Five-Year Plan of the Unified System of the Planning of Capital Construction (YeSPKS) is of substantial importance in the matter of improving the technology of drafting annual and five-year plans. The functioning of this system will make it possible on the basis of the development of integrated databases with respect to the levels of management of capital construction with the use of uniform cards of construction projects and comprehensive methods and models of information processing to increase the level of balance of the amounts of capital investments and construction and installation work with the resources of investments and the capacities of construction and installation organizations. An important role should be played by the designing and gradual introduction during the 12th Five-Year Plan of functional complexes of planning calculations, which ensure:

--the increase of the soundness of the planning of the development of science and technology by means of the substantial enlargement of the database of calculations, the coordination of the plan indicators of the prospects of science and technology with the planning of production, capital construction, material and technical supply, labor and personnel, the production cost and the profit, as well as by the automation of the process of formulating the characteristics of scientific and technical goal programs and the monitoring of the progress of their fulfillment;

--the development of an interconnected set of calculations on computer of the indicators of the plans of social development and the increase of the standard of living of the people, which includes the determination of the resource portion of national consumption, the commodity backing of the retail commodity turnover, and the expansion of services and calculations of the balance of the monetary income and expenditures of the population, the personal consumption fund, as well as the development of sectors of the nonproduction sphere and public consumption funds with an outlet to the consumption fund in the used national income;

--the improvement of the planning of manpower resources on the basis of the formation of an internally consistent multilevel system of balances of manpower resources by oblasts, cities, and republics as a whole in conjunction with the formulation of demographic forecasts with a breakdown by oblasts (cities) and republics.

Fourth, it is necessary to ensure the introduction in the technology of drafting the long-range plan of the integrated complex of balance sheet calculations for the substantiation of the most important indicators of the development of the national economy when formulating the concept and basic directions of USSR economic and social development for the long-range future. This complex should be oriented toward the formation of the indicators, which characterize the solution of the most important social problems, their coordination with the indicators of scientific and technical progress, and the elaboration on this basis of the intersectorial aspects of the investment strategy and versions of the rate and proportions of the development of the national economy in the long-range future. For the development of this complex it is necessary to expand substantially the introduction in planning practice of the methods of forecasting, simulation, and the construction of socioeconomic scenarios. The practical making of forecasting, analytical, and planning calculations will require the formation of the corresponding database of the functioning of the entire integrated complex of balance sheet calculations in an interactive mode.

Fifth, the development of the technologies of comprehensive sectorial planning, which envisages the development of the intersectorial complexes of calculations, the formation of which is already being carried out during the 11th Five-Year Plan in the process of developing the automated system for planning calculations (the agroindustrial, fuel and energy, and machine building complexes), and the development and introduction of the intersubsystem complexes which are being newly established (the chemical, construction materials, consumer goods, transportation, nonproduction sphere, and other complexes), is necessary for the purpose of ensuring the closer coordination of the plans of the development of a group of interconnected sectors and the accounting of the use of the achievements of scientific and technical progress. As experience shows, optimization and balance sheet calculations, as well as a set of advanced norms should be used extensively here. The close link and coordination of the indicators of the development of intersectorial complexes with the indicators of the plan of national economic development as a whole, as well as its breakdown by territories and sectors are an important feature of this work.

Sixth, for the purpose of preparing measures on the fulfillment of the plan assignments and committing to national economic activity the additionally identified resources it is necessary to complete the development and to introduce the complex of calculations for the monitoring of the progress of the fulfillment of the basic indicators of the state plan on the basis of the fundamental interaction of the automated system for planning calculations with the automated system for state statistics of the USSR Central Statistical Administration.

Thus, during the 12th Five-Year Plan the improvement of the drafting of state plans will be ensured by the extensive multipurpose use of mathematical economic methods, data processing equipment, and computer technology.

However, the development of a unified automated technology of planning requires not only the automation of the formalized procedures of drafting the plan, but also the active use of the methods and means of the automated system for planning calculations as tools of the information service of planning workers during the performance by them of current planning and operational work, that is, they should use an advanced system of mathematical economic methods. It is necessary to coordinate the solution of formalized problems with the fulfillment by planning workers of nonformalized procedures, which are connected with expert appraisals of factors and resources and the characteristics of socioeconomic processes and objects, which did not find reflection in the set of developed and used methods and means of the automated system for planning calculations.

Such a fundamental combination requires a qualitatively new level of development of the automated system for planning calculations: the solution of the problem of the direct access of planning workers to information, its dynamic exchange both within the planning organ and with ministries and departments; the affording of the opportunity to work with documents in an automated mode. This will create the conditions for the increase of the level of soundness of the planning decisions being made in the USSR State Planning Committee and the state planning committees of the union republics on key questions of the draft plan being drawn up and the monitoring of the progress of the realization of the approved assignments. The development of a system of automated workplaces (ARM's) of planning workers, which makes it possible to provide the entire necessary set of services on access to and the transmission and processing of economic planning information and documents, is becoming important.

From this it follows that it is necessary to aim the development of the automated system for planning calculations during the 12th Five-Year Plan at the creation of the conditions for the direct access of planning workers to the banks of planning, standard, statistical, reference, and other information, as well as for the automated formation of planning documents, current inquiries, and other materials on the basis of the processing of both numerical and textual data. Here the interactive mode of the work of the user with computer hardware both in the process of solving economic planning problems and in current planning and operational activity should become the main thing when making the calculations.

As domestic and foreign experience shows, the solution of these problems can be successful only in case of the development of a computer network of the automated system for planning calculations. Such a network appears as an interconnected and interacting set of programs, information aids, and hardware, which ensure the collection, processing, storage, representation, and transmission of economic planning information. It includes data processing and storage centers, which are based on high-performance computers, data transmission systems, and terminals in the forms of automated workplaces of planning workers.

It is obvious that the complete solution of the problem of establishing such a network also constitutes the long-range goal of the development of the technical base of the automated system for planning calculations. However, already during the 12th Five-Year Plan the development and pilot introduction of the basis components of this network should be carried out along with the performance of the necessary amount of scientific research and design work. It is proposed to view as such fragments the intradepartmental computer networks of the USSR State Planning Committee, the state planning committees of the union republics, and the city planning commissions of Moscow and Leningrad.

The intradepartmental computer networks are oriented toward multifunctional distributed data processing and should become a means of the integration of local computer networks. The functioning of the intradepartmental network will enable the planning worker to obtain all the computer resources required for work, to make planning calculations in an interactive mode and to draw up their results, and to perform current operational work. For these purposes he will have direct access to all the necessary economic planning information and the opportunity to work with it in a mode which conforms to the specific nature of his practical activity, as well as to share information with other planning workers.

In conformity with this the multifunctional automated workplaces, which ensure the making available to the planning worker of a wide range of services, including the processing of numerical and textual information, the receipt of reports, the transmission of messages, and others, should become the most important component of the network in question.

The system of YeS computers, which are linked by means of intercomputer communications, as well as the automated workplaces of planning workers, who are furnished with Iskra-226 minicomputers and remote terminals of the Unified System of Computers, can constitute today the basis of the intradepartmental computer network. The further development of the intradepartmental computer network will be accomplished in stages with the output by domestic industry of terminal YeS computers, which provide for both the local and remote connecting of automated workplaces, as well as the output of personal computers, which are logically and technically compatible with the Unified System of Computers and are furnished with terminal display facilities. In turn personal computers should become the technological tool, on the basis of which multifunctional automated workplaces will be developed.

The designing and introduction of intradepartmental computer networks are inseparably connected with the problem of the formation of local data banks in the departments of the USSR State Planning Committee and in the state planning committees of the union republics, as well as with the development of means of interactive work with these banks, which are oriented toward the planning worker. Here an efficient technology of the interaction with the Unified System of Computers of personal computers, which are equipped with high-quality means of interaction, should be envisaged.

During the 11th Five-Year Plan the developers of the automated system for planning calculations created a significant systems reserve in this area. Thus, a system of the intercomputer exchange of data based on the Ryad-2 unified system of computers was developed; a collective access system with the connection of automated workplaces to the information and computer resources of the Unified System of Computers was introduced, and so on.

Thus, the basic fragments of the computer network, which make it possible in practice to begin its gradual development, have been worked out. If we speak about the immediate prospects, during the 12th Five-Year Plan it is possible actually to pose tasks on the development and introduction of entire fragments of the intradepartmental and local computer networks, which unite the multifunctional and specialized automated workplaces of planning workers.

The results of the work on the development of the automated system for planning calculations during the 12th Five-Year Plan should create the conditions for the achievement of a qualitatively new level in the technology of planning, which is characterized by:

--the extensive use of simulation equipment for the increase of the soundness of planning decisions, first of all for the national economy as a whole, the active introduction of mathematical economic models in those areas of planning work, in which their use will make it possible to obtain the greatest impact from the standpoint of the interconnection and balance of planning decisions;

--the improvement of the database of planning on the basis of the organization of the interaction of the automated system for planning calculations with the automated control systems of ministries, departments, and territorial organs of management;

--the increase of the integration of planning calculations and the development of the information and procedural linking of individual calculations and planning operations into unified technological computer and data processing complexes;

--the expansion of the sphere of application of computer technology for the purpose of the more complete use of the potentials of high-speed computers, minicomputers, peripheral systems, terminals, and channels and means of communications for the increase of the efficiency of planning work.

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AUTOMATION AND INFORMATION POLICY

REGIONAL COMPUTER SUBNETWORK LINKS LENINGRAD, RIGA, MOSCOW

Moscow TRUD in Russian 15 Dec 85 p 2

[Article by Ye. Druzhinina under the rubric "On the Paths of Technical Progress" (Leningrad): "We Are Buying Information"; first paragraph is TRUD introduction]

[Text] At the Leningrad Institute of Information Science and Automation of the USSR Academy of Sciences the Northwest Regional Computer Subnetwork has been put into operation. It united the spit of Vasilyevskiy Island with the academic centers in Riga and Moscow. In this way the idea of creating a collective-use information-computer network is being implemented in the city on the Neva. This idea is already yielding an impact of 17 million rubles a year.

The screens give off a green glow, the keyboard of the displays rustles softly. The people, who gather in this room, at times are totally unacquainted with each other. What unites them? The answer is simple: the computer, the "mechanical brain" of the Institute of Information Science. For example, G. Boguslavskaya, chief design engineer of the Northern Scientific Research Institute of Hydraulic Engineering and Reclamation, is making a calculation of the prospects of the development of reclamation in the Nonchernozem Zone of the RSFSR for the 12th Five-Year Plan. While S. Ivankiv, an engineer of the Scientific Research Institute of Physics of Leningrad State University, is working on the problem of developing a photochemical model of gases in the atmosphere....

The thematic range of the solution of problems and of the information, which is obtainable from the collective-use network, is rich. The new technological conditions of baking and the theoretical calculation of the reliability of the design of a metal bridge, the forecasting of fashion and new methods of corrosion protection--the user of computer time, who is accredited at the Institute of Information Science and Automation of USSR Academy of Sciences, can turn here with any problem. The number of Leningrad users alone is approaching 1,500 and is continuing to increase rapidly. For the institute is the most powerful computer center of the Academy of Sciences in the Northwest Region, and its stock of computers is called upon to provide with information and computer time all the specialists interested in this, who do not have such equipment.

"Strictly speaking, the fact that some of our users are still forced to spend time in order to come to us, and at times to wait until a terminal is free, is a shortcoming in our work, and in the future we will get rid of it. According to the idea of the collective network the user has a small computer with a display at his workplace, but solves problems on our computers, by linking up automatically with the center. That is how it is already being done at many places," Candidate of Technical Sciences Aleksandr Nikolayevich Domaratskiy, deputy director of the institute, relates.

What is the point of the collective-use network? The very first association is the comparison of our small home libraries with the State Public Library. Imagine that, by having at home a small computer with a display, you obtain access to all the wealth of the main library of the country.... The collective-use network affords specialists of all fields precisely such an imposing prospect.

"Circles radiate from a stone which has been thrown into the water. The Leningrad information-computer network of the USSR Academy of Sciences is expanding according to the same law. First it united all the institutions of the Academy of Sciences in the city and oblast. Several years ago educational and sectorial institutes, plants, and associations were connected to it," Aleksandr Nikolayevich continues the story. "In 2 years it is planned to place into pilot operation the collective academy network throughout the country. It will unite eight regional subnetworks with the centers in Moscow, Leningrad, Riga, Kiev, Tashkent, Sverdlovsk, Novosibirsk, and Khabarovsk, our Northwest Subnetwork is already in operation."

For the uninitiated the question might arise: Why not calculate in each city on its own computers? One of the prominent scientists recently proposed the aphorism: "First they replaced wisdom with knowledge, now information is superceding knowledge." Indeed, today so much information is required that it is impossible to hold it in a single repository. Thus, the Northwest Subnetwork now has access to the databases of the Leningrad Scientific and Technical Information Center, while in the future will receive it to the "reserves" of the All-Union Scientific Research Institute of Technical Information, Classification, and Coding of the USSR State Committee for Standards and the International Information Center.... The problem is solvable, if the collective-use network has both a vast memory and the opportunity to use all the reserve capacities of the computer. It is all the same to the user, from where he will obtain an answer. Therefore, the ideal arrangement of work in a few years will be the following: the engineer will not travel across the entire city to Vasilyevskiy Island, but will send his problem to the center, from which it can be sent automatically, say, to Khabarovsk, if at precisely this moment there are idle computer resources there.

The creation of a unified statewide collective computer network is a global idea which was dictated by the requirements of scientific and technical progress. But is it justified economically? For the creation of reliable communications lines over the territory of the enormous country is not a trifling job....

"Since 1980 the Leningrad information-computer network has been profitable," A. Domaratskiy says. "In a year the economic impact from the operation of our center comes on the average to 17 million rubles, moreover, 3,000 people are conditionally freed. These figures--and the constantly increasing number of organizations which want to be users of our computers--convince us: the creation of a collective network is a useful, necessary, and profitable matter."

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METHODS AND MODELS FOR PLANNING THE AUTOMATION OF MANAGEMENT/CONTROL (SURVEY)

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[Text] Introduction

The problem of ensuring maximal effectiveness in the automation of management/control is not settled just by questions of constructing individual systems -- purposeful management/control of the process as a whole is of no less significance. The attention, however, paid to exploring this aspect is not in keeping with its significance. In the practice of planning management/control automation, because of the poor scientific development of these questions, they are dominated by empirical methods which do not permit the selection of the most rational paths of development for the process being planned and which lead to insufficiently justified planning decisions. Thereby, the effectiveness of management/control automation is lowered in comparison with what is potentially achievable.

It appears useful, despite the small number of works devoted to planning management/control automation, to generalize on the results obtained up to the present time. This can help to stimulate research in this field.

The present survey is devoted only to the "strategic" sphere of making planning decisions, that is, those which have a noticeable influence on the development of management/control automation as a whole: middle- and long-term planning at the level of a whole industry and of a large organization that develops automated management/control systems (ASU) (the activities of which have an inter-industry character), or of the national economy. In describing methods and models, the terminology and designations adopted by their authors are used. The concept "creation of an ASU," used for brevity, also includes the development of operating systems.

Approaches to Planning Automated Management/Control

Planning at the Level of an Industry

The first attempt to formulate the principles and the technology for selecting a group of enterprises at which to create ASU's is the methodology represented in

reference 1 (pp. 54-62). It is designated for use in planning the development of projects for the automation of enterprise management (first of all, in the machine-building branches of the economy) and has been approved by the Ministry of the Machine Tool and Tool Building Industry.

The achievement of maximal economic effectiveness in capital investments for the creation of an ASU complex in an industry on the basis of organizing standard developments for enterprises of various sub-industries has been adopted as the goal for planning. The problem of selecting installations for management/control automation is formulated in the following manner: It is necessary, with specified funds for financing ASU projects for the five-year plan, to select, from among all enterprises of an industry, those for which such measures are the most advisable.

Significant in the methodology is the preliminary classification of enterprises to isolate homogeneous groups. Fulfillment of the condition of maximal effectiveness in investment is provided for first of all by calculating the possibility for diffusing the experience of the representative enterprises to the whole group. The basic integrated classification criteria that have been adopted are the number of workers -- as an index reflecting the requirement of the enterprise for informational and computer work -- and the output of products -- as a parameter characterizing the possible economic effectiveness of automating management/control at the installation.

Among all enterprises in an industry, potential installations for automation are singled out and divided into two classes: large and middle-sized. Then, there is an evaluation of the resources within the industry that are allocated to the creation of ASU's. Proceeding from the normative costs of "large" and "middle-sized" systems and the number of large and middle-sized enterprises, the possible number of "large" and "middle-sized" systems is determined for the plan period. The totality of installations with potential for automation is divided into groups of "standard" enterprises with consideration of the possible number of "large" and "middle-sized" systems. From each group is selected a representative enterprise, at which an ASU will be created during the plan period (the means for selecting specific enterprises is not specified by the methodology). The number of systems being created during the plan period is taken as a given, and it determines the quantity of separable groups of enterprises.

Obviously, the basic task of management/control automation here is not the direct increase in the economic effectiveness of the activities of the industry. The chief task is the creation of the prerequisites for the broad expansion of ASU introduction on a standard basis; the methodology is directed toward determining the installations at which the pay-off of basic ASU projects will come from their later (beyond the plan period) dissemination to other enterprises of the industry. This is one of the reasons that it is not recognized as advantageous to give a strict formalization of the criteria for the optimality of the plan for creating ASU's.

A simple method for the selection and economic justification of priorities for creating ASU's in an industry is also proposed in reference 2. It consists of the following. Potential installations for automation are ordered according to the decreasing economic effect of ASU's at these installations with the coincidence of the value of a given index and according to the growth in expenditures for creating

a system ("cost of development + capital investment"). The fund for capital investments is distributed to the installations ordered in this manner until it is used up; as a result of this, we obtain a list of ASU's to be included in the plan. The priority for creating systems for the selected installations is determined by their priority -- the position in the ordered list.

Reference 3 is devoted to the formalization of the process of developing a plan for the automation of management/control for an industry. There is a list of installations with potential for automation which are characterized by the requirement for resources of various types for creating ASU's and by the yearly economic effect and size of the savings obtained from the functioning of the system. For an industry, there are limits established for each type of resource and the lower limit in the size of the savings that should be obtained as a result of introducing computer technology. On this basis are formed constraints to the problem of integral linear programming with Boolean variables (the installation is or is not included in the plan). The criterion of optimality is the maximum total economic effect by industry. A stochastic model of this problem is also examined, taking into account the probabilistic nature of the characteristics of the results of management/control automation.

In reference 4 (pp. 60-83) an approach is proposed for optimization of long-term industry-wide plans for creating ASU's based on consideration of the variance of possible systems; it was tested in a group "B" industry. Variance was conditioned by combinations at the installation of planning unit ASUP (Plant Management Automation System) (ASUPp) [not further identified] with various regulating units ASUPr) [expansion not available] and some ASU TP (Plant Technical Management Automation System); in addition, variants are distinguished by the sequence of introduction of individual units at an enterprise (association, or combine).

The selection of a definite variant also predetermines the dynamics of creating ASU's at an installation. For example, the following sequence in the creation (by five-year plans) and composition of system units can be possible variants in management/control automation: ASU TP -- ASUPp -- ASU TP or ASUPr -- break -- ASUPp. The starting point for developing a plan is the construction of all possible variants of ASU's with consideration of certain additional conditions (for example, the limitedness of the ASU developer organization can be taken into consideration in that during a five-year plan at each installation no more than one unit of any type is provided for). Then, a choice is made with consideration of technical and economic expediency: for example, variants are excluded which contain more than one ASUPp, which do not provide for the creation in the last five-year plan of the plan period of even one unit of any type, and so forth.

For all types of units (ASUPp, ASUPr, and ASU TP), standards are determined for expenditures of financial resources for the development and hardware (with consideration of their time reduction), and then, for each variant in ASU creation, the expenditures for its implementation are calculated. The minimum expenditures of financial resources for the creation of an ASU complex in an industry is adopted as the criterion for optimality of the plan.

The minimal set of installations is dependent on two conditions: (1) fulfilling the rerequisites for multiplicating systems for installations of various classes, that

is, the plan should provide for the creation at the beginning of the period being planned for of at least one unit of each type for each class of installation; (2) the introduction during the plan period of such a number of ASU's as to satisfy the primary requirement of the industry for automation of management/control (for example, ASU TP's should be introduced with all sufficiently large technological processes, no less than one ASUPr is introduced at each of the installations examined, and so forth).

These conditions serve as constraints in the mathematical model for the selection of the "optimal plan-minimum." Models are constructed similarly for "maximal" and "intermediate" variants of the plan. These variants form the basis for plan development.

References 5 and 6 examine the methodological principles and models for optimization of plans within industries for automation of management/control, with the criterion of maximum integral economic effect. Experience in experimental application (in the construction industry of republic subordination) and the results of optimizational calculations are accounted for in reference 7.

At the preliminary stage, a certain number of ASU variants are studied that are possible for automation at each of the potential installations. For this, a classification of systems is proposed, that is, such study is accomplished not for each individual installation, but for defined groups of them although, generally speaking, the presence of individual systems also is not excluded (one possible method of formulating the set of ASU variants for an installation or group of installations is proposed in reference 5.) An ASU variant for a certain installation (group) is characterized by expected values: coefficients of the growth in volume of realized products and reduction of expenses per ruble of this volume and the expenditure of resources for operating the ASU and its creation (by years), and the duration of creation. The parametric task of the characteristics of the ASU variant permits determining the economic indices of the system in dependence of the lengths of time for creation for any year of the period and installation of a group in the case of a "group" variant on the basis of the dynamics of the yearly volume of realized products and expenditures per ruble of this volume, planned (forecast) with the absence of ASU's at the installation.

The task of optimizing the plan consists of the selection of installations at which ASU's will be created, variants, and lengths of time for creating systems. The functional purpose -- the integrated economic effect during a certain period (exceeding the plan period) from the whole complex of systems included in the plan -- represents the difference between the total growth in profit during the specified period and the expenditures for creating the systems, brought to the base year. The models provide the possibility for developing systems at various hierarchical levels of the industry's management; in this case the functional purpose reflects the "cumulative" effect caused by combined influence of co-subordinate systems.

The constraints take into account the limitations in a number of resources and the directive requirements for certain ASU's. Scientific and technical progress in the area of management/control automation is characterized by the replacement of "generations" of the same ASU variants (formally represented as different). For this, constraints are introduced from above and below on the possible lengths of time for inclusion in the plan for the creation of the same ASU variants.

"Inter-Industry" Level of Planning

The statement of the problem and the model for optimization of the long-range plan for a large ASU-developer organization is proposed in reference 8; experience in utilization within the framework of a specific ASU-NII [expansion not available] is examined in reference 9. The organization accomplishes ASU development on a contract basis for various economic components independent of their agency subordination and operates on cost-accounting principles. Such an organization fulfills orders for a large number of industries, although it usually does not encompass the whole complex of systems being created by each of them (therefore, the words "inter-industry" are put in quotation marks). *

The plan of the organization is composed on the basis of the log of orders, the "volume" of which exceeds its capabilities. Each order contains data on the corresponding installation being automated. Considering the degree of their uniformity and existing analogies, possible variants are formulated for the functional structure of ASU's for each installation $r=1,\ldots,R_i$ (i = index of the installation) and, with a given functional structure, variants are formulated for the process of developing a system (methods for distributing resources in time in the process of development) $l=1,\ldots,L_i^r$. In optimizing the plan, installations are selected for automation from the number existing in the log of orders, the methods (r,l), and lengths of time for developing systems for them. This takes into consideration the mutual influence of developments -- the dependence of their labor content and their duration on the sequence of accomplishment (owing to the accumulation of experience and to the direct use of the results of previous research, and so forth).

The model represents a problem of nonlinear integral programming with Boolean variables $x_i^{rl\tau_H}$, assuming the value 1, if the plan includes ASU creation at installation i by method (r,l) with the start of development in quarter τ_H (the time step adopted in the model is 1 quarter). The criterion for plan optimality is the maximum of mathematical expectation of integrated economic effect from introducing the results of the developments included in the plan. In the "expenditures" part of the criteria are isolated the capital investments of the customers for ASU creation and expenditures of the developer organization for designing the systems. Also proposed is another possible criterion -- the maximum quantity of ASU's put into industrial operation in a plan period. The system of constraints describes in detail the conditions for activity of the organization and determines the requirements for the dynamics of putting the system into operation and for the use of resources.

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* The inclusion of this area of planning in the present survey is due to the fact that we compare the scale of activity of such organizations with the scales of projects for creating ASU's in individual industries (and even exceeds them). Thus, according to data in reference 9 (p. 138), the volume of work on designing ASU's in the scientific research institutes being examined constituted about 25 million rubles during the five-year plan, which corresponds to the development of 50 to 60 systems. For comparison, let us point out that the optimal plan calculated in reference 7 provided for the creation of 15 systems during the five-year plan in the industry (of republic subordination).

Planning at the Level of the National Economy

The idea of constructing the plan for management/control automation on the basis of classifying installations with potential for automation is advanced in reference 1 and is further developed in the system for planning by central economic planning organizations (references 10; 11, pp. 219-254; and 12, pp. 60-89). The development of the five-year plan for introducing computer technology in the economy in this system includes the following stages: the selection of installations for automation; their classification and grouping; the composition of progressive consolidated standards; the definition and computation of constraints on capital investments, materials, and labor and financial resources; and the definition of the economic effectiveness of creating ASU's.

The aim of classification is the grouping of installations according to the volume of information subject to automated processing. Insofar as it is difficult to estimate this volume directly at the present time, the classification indices used are indices that characterize it indirectly (parameters that reflect the scale of production: number of workers, volume of product output, and so forth). Installations subject to the introduction of computer technology are grouped according to these indices and, for the isolated groups, ranges in volumes of information subject to computer processing are defined.

The advantage in creating or developing ASU's for individual groups of installations is evaluated on the basis of statistical data on the effectiveness of systems existing in the industry being examined or in analogous industries. The set of installations where it is economically advantageous to create and develop ASU's is determined by comparing coefficients E_{ij} (here i= the index of a group of installations, and j = the index of an installation in this group) of the general (absolute) effectiveness of capital investment in the introduction of computer technology for various classification groups with an established standard coefficient for the industry or for the economy $E_{\text{нвт}}$

$$M=\{i|\sum_{j=1}^{n_i} E_{ij}/n_i \geqslant E_{\text{нвт}}\},$$

where n_i = the quantity of installations in group i.

The general volume of information subject to automated processing is calculated according to the formula

$$Q=\sum_i \sum_l q_{il} x_{il},$$

where q_{il} = the volume of information being processed in the ASU of the installation of group i at stage l; x_{il} = number of installations of group i at stage l.

Hence, on the basis of various standards and prognostic data (the average number of operations per byte of information, the relationship between types of problems, the average cost of a unit of computer capability, the structure of capital investments, labor productivity for ASU developers, and so forth), plan indices are determined according to the standard working formulas: the necessary capacity of the stock of

computers, the volumes of capital investments and other expenditures, according to type, the number of developers, and others.

Constraints by computer hardware resources, capital investment, and so forth can be brought into the correction of the standard of effectiveness $E_{\text{нвт}}$ and correspondingly into a change in the quantity of installations scheduled for introduction. Thus, the plan is composed by iteration and together with it is established the final value of $E_{\text{нвт}}$. The completing stage is the calculation of savings obtained through measures for the introduction of computer technology.

References 13-15 describe a scheme for developing long-range plans for the distribution of computer hardware. This scheme provides for a multi-level integrated procedure for planning based on joint utilization of economic-mathematical methods and informal methods for making decisions.

The starting point is the formulation of the vector for the limits in computer hardware resources. Then, with the aid of the dynamic problem of linear programming solved for the minimum normalized expenditures for the production and introduction of computer technology, computer hardware is distributed by years of the plan period, by directions of introduction (ASU TP, ASUP, SAPR [Computer-Aided Design] and so forth), and by groups of ministries. Taken into consideration are constraints from hardware resources, capital investment, effectiveness, and others (reference 13). Further, expert correction is accomplished - in several cycles -- for the solution obtained, with consideration of various factors absent in the model (a reversion to preceding levels being possible). At the subsequent level of elaboration, computer hardware is distributed by ministries (agencies) and directions of introduction for each year of the five-year plan with the aid of the statistical problem of linear programming. Desired variables are values $x_{\mu l}$ -- the quantity of systems in direction l in industry μ ; specific installations (systems) are determined at the stage of yearly planning. The criterion of optimality has the appearance

$$\sum_{\mu \in g} \sum_{l=1}^{L} x_{\mu l} \Pi_{\mu l} \to \max,$$

where g = the group of industries being examined;
$\Pi_{\mu l}$ = the integrated index of importance of the direction of introduction l in industry μ ,

$$\Pi_{\mu l} = \gamma_{\mu l} \sum_{f} C_f \Pi_{\mu l}',$$

where $\gamma_{\mu l}$ = expert evaluation of the significance of direction l in industry μ (taking into consideration particularly its priority);
$\Pi_{\mu l}'$ = component f of the integrated index of importance (growth in product output, cost reduction from introduction of computer technology, the presence of computer capabilities, and others); and
C_f = expert evaluation of the weight of the corresponding component.

Starting with the standards for the "average" system, constraints are formulated for computer hardware resources and the effectiveness of introducing computer technology

by given group of ministries; in addition, the constraint system includes requirements that the quantity of systems of each direction be equal to that specified (with upper levels of planning). The solution obtained also can be subjected to expert correction. Redistribution is accomplished with the aid of a special heuristic algorithm. On the basis of comparing the results of the correction with the optimal solution, further cycles of redistribution can be conducted.

Comparative Analysis

Having examined the contents of individual approaches to the development of plans for automation of management/control, let us proceed to their analysis. Let us note that the assignment of an approach to a definite level of planning is not absolute: with specific modifications, some of them can also be used at other levels.

The chief distinguishing features of the planning methods examined are put into the table, where the sign "+" denotes the presence of a corresponding characteristic and the sign "-" its absence.

Table. Basic Characteristics of the Approaches Examined

(1) Метод	(2) Использование формализованной модели	(3) Ориентация на конкретные объекты	(4) Учет вариантности систем	(5) Учет динамики процесса	(6) Учет неопределенности
[1]	-	-	-	-	-
[2]	-	+	-	-	-
[3]	+	+	-	-	+
[4]	+	-	+	+	-
[5-7]	+	+	+	+	-
[8]	+	+	+	+	+
[10-12]	-	-	-	-	-
[13-15]	+	-	-	+	-

Key:
1. Method
2. Utilization of formalized model
3. Orientation toward specific installations
4. Consideration of system variance
5. Consideration of the dynamics of the process
6. Consideration of uncertainty

All planning methods described in the literature for creating ASU's are essentially optimizational, although it is not imperative that formalized optimizational models be used (references 1, 2, and 10-12).

It is characteristic that models for composing a plan for the automation of management/control are invariably formulated as problems of discrete programming. This is caused by the objective properties of the problem. First, capital investments in computer hardware are essentially discrete, and this does not permit the examination of expenditures for ASU creation as continuous quantities. Secondly, even if expenditures can be changed smoothly (for example, with orientation to the use of collective-use computer center services), the construction of specific continuous dependence of the system parameters -- chiefly, economic effect -- on expenditures is tied to practically insurmountable difficulties. As a result, various scales of management/control automation at an installation are represented as a finite set of

possible ASU variants, considered as indivisible, and the problem consists of selecting one of them (more precisely, no more than one) for each installation (in references 3, 14, and 15, one variant of a possible system is provided for, and the task comes to searching for answers to the question whether to create an ASU at a given installation or not).

The difficulties tied to the realization of models of the class indicated are rather evident. These difficulties are also one of the reasons for rejecting strict formalization in the alternative group of methods.

Important also is the aspect according to which the concepts examined are divided into two groups -- whether it includes the given method of selecting specific installations for automation ("by installation" methods, references 2, 3, and 5-8) or only the total number of systems of one or another type is being planned ("by volume" methods, references 1, 4, 10-12-15). This distinction has a good reason -- an approach to the problem of information support for plan calculations that is different in principle.

Implementation of the "by installation" methods requires knowledge of economic indices for management/control automation (expected expenditures and results) by each specific installation with automation potential. In order to define them with a sufficient degree of reliability, knowledge is necessary at least about the conceptual directions in the construction of a future system (about the functional structure, hardware, and other items). In practice, during the compilation of a long-term plan, such knowledge is absent, since the basic design decisions on the system are adopted during the development of the economic and technical justification and the technical task for ASU development, that is, after the decision has been made concerning its creation -- at the stage of plan implementation.

Thus, the practical utilization of "by installation" methods unavoidably requires the transference of a part of the projects now being accomplished during the design of systems to the development stage of the long-range plan for management/control automation (the consolidated study of one or several variants of a possible system clearly having been done for a larger number of installations than will be included in the plan). * In references 5-7, such an approach is implemented by means of preliminary formulation, starting with possible means for standardization of design, of sets of ASU variants for groups of similar installations. In reference 8, preliminary decisions on the system which define the parameters necessary for plan optimization are made on the basis of analogs (examining the given installation in the context of developments accomplished earlier). Authors of references 2 and 3 do not discuss the economic and organizational conditions for the application of the approaches proposed by them.

As is evident, the utilization of "by installation" methods is involved with difficulties of an organizational character and with significant increase of labor

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* Individual ASU developer organizations, to a certain degree, already implement this idea in practice in the form of the so-called "pre-contract survey" of an installation proposed for automation and "express-estimate" of the effectiveness of a possible ASU for definitions of the advantage of management/control automation at that site.

content and complication in preparing the initial data for planning, and so forth. The "by volume" methods solve the problem of information support, not by elaboration and deepening of planning calculations, but on the basis of using the concept of an "averaged" system (installation). The necessary initial data are formed with the aid of generalizing statistical calculations and also, to some degree, are defined in a standard way. It is natural that the parameters of specific systems can deviate from the parameters of the averaged system and, at the level of the planning object as a whole (industry, economy), the deviations cancel one another out. This is why the "by volume" methods determine only the general number of ASU's of various types, and the "tying in" of the systems with specific economic installations is accomplished informally.

The advantages of the "by volume" methods are that they can be used in the absence of adequately reliable data on the expected results (effectiveness) of automating management/control in individual economic components and is incorporated more easily than the "by installation" methods into existing planning practice. But this is achieved at the price of a more aggregated, rougher presentation of the process being planned and, as a result, the possibility is narrowed for the selection of the best plan variant. Specifically, "averaging" of systems eliminates the differences among the scales of management/control automation at similar installations.

Another way for taking uncertainty into account is adopted in references 3 and 8. In reference 3, a stochastic model is proposed for plan optimization and, in reference 8, certain parameters of the model are mathematical expectations for corresponding amounts. However, in our opinion, this way is not very promising, since the uncertainty of the parameters of individual systems basically do not have a probabilistic character. The theoretical uncertainty of the quantitative values of the expec ted effect is related, first of all, to the insufficiencies of existing methods for estimating the economic effectiveness of ASU's in which a significant share of original data for calculation is determined by expert means and, secondly, to the fact that the potential capabilities of the system can be realized to different degrees in practice.

Problems in Practical Application

Before passing on to a discussion of the possibilities for applying the methods examined, let us provide a short analysis of the evolving practice of planning management/control automation. Since, for the level of the national economy, a sufficiently detailed analysis is contained in references 12 and 16, we will be limited to the industry level.

In the practice of industry planning for management/control automation, two approaches are segregated which, by analogy with the foregoing section, can be characterized as "by volume" and "by installation."

The scheme for plan development using the "by volume" approach looks, in general outline, as follows. Initially, the overall volume of capital investments in management/control automation is determined: according to standards (as a share of the total volume of capital investments for the development of the industry), according to evolving trends, and so forth. The dynamics of capital investments are calculated from considerations of their proportional growth (increase) by years of

the plan period. Then, proceeding from the evolved structure of capital investments, expenditures are set for computer technology, equipment, construction and installation work, and others. The quantity of systems being created is determined according to average expenditures per system, or a defined growth in quantity of ASU's by comparison with the previous period is given. Since, in this approach, the index of economic effect (additional growth in profit because of management/control automation) cannot be obtained by any substantiated calculations, it is found simply by the standard coefficient of effectiveness $E_{\text{нвт}}$.

In the "by installation" approach, the creation of ASU's at specific economic components of the industry are taken as the basis for plan development, and the volume indices of the plan are calculated by summarizing indices for individual systems. Inclusion in the plan for creating one system or another is accomplished by proposals by potential installations for management/control automation (enterprises, and so forth) and (or) by ASU developer organizations which, above all, are guided not by industry-wide but by local interests. In a number of cases, initiative proceeds from industry management. But then the selection of installations for automation is conducted according to various non-economic considerations (in any event, economic considerations do not come first). In the majority of cases, there is no preliminary consolidated study of decisions on future systems with the aim of estimating their economic indices. The size of expenditures for creating each system is determined by rough analogies and by ad hoc considerations by the developer, proceeding from the idea of the planning organization of "reasonable" size of the expenditures, and so forth. Expected effectiveness of the system is also established by analogy or is taken as equal to the standard (in conformity with $E_{\text{нвт}}$ or according to standards existing among developer organizations for the effect per ruble of expenditures for ASU design). It is characteristic that each future system is examined by itself, outside the relationship with the total process of automating management/control in the industry as a whole.

Usually, the "by volume" and "by installation" approaches are not applied in pure form in practice, but in a combination with one another. Many modifications of these approaches exist. However, their common characteristic is the absence of clear methodological principles for the development of industry plans for management/control automation and the absence of justification for plan decisions. As a consequence, the composition of plans is dominated by empirical methods for formulating decisions, based on the intuition of plan workers, consideration of evolved "traditions," various qualitative considerations, and so forth. Practically no comparative analysis is done of various variants either for individual systems, or for the plan as a whole, to say nothing of multivariant calculations. All this has led to weak justification of industry plans for management/control automation and insufficient orientation of the planned process toward the realization of its main goal -- increase in the effectiveness of the economic and productive activities of the industry.

A restructuring is necessary in the practice of planning management/control automation, first of all, by replacing the empirical methods of plan development by scientific methods based on economic calculations. The basic task in this is to provide the most rational use possible of the resources allocated to the automation of management/control in the industry. However, the advisability of introducing one or another of the methods discussed earlier depends not only on how completely

accomplishes this task but also on the objective conditions of the specific object of planning -- particularly on the possibilities for informational, organizational, and personnel support for the practical utilization of a given method. Let us attempt, from this point of view, to briefly characterize individual methods and determine the corresponding special features of the conditions for application.

The methods proposed in reference 1 are not related to the quantitative estimate of the economic effectiveness of management/control automation. It therefore seems that it is advantageous to use it in those cases when such an estimate cannot be obtained with the necessary degree of reliability at the beginning stages of work in creating ASU's in an industry (for planning he development of "base" systems); in spheres where the effect of automating management/control has basically a non-economic character (in health care and similar areas), and others. In addition, it will be useful in selecting installations at which experimental ASU's should be created and tried out, along with the use of other methods for systems directly aimed toward increasing the economic effectiveness of the industry's activity. Building this method into an operating planning system does not involve any significant difficulties at all. But, at the same time, the results are rather limited: the application of the methods from reference 1 permit only the outlining of the areas from which automation objects have to be selected, otherwise leaving the existing planning practice unchanged.

The method described in reference 2 is attractive because of its simplicity. It can be used under conditions of "hand" calculations; however, it needs some modification. The aim of the method is to determine the set of systems that provides the greatest overall economic effect. But the proposed procedure for selecting installations in the general case does not permit the achievement of this aim. Meanwhile, the procedure for composing the plan in the reference 2 statement is rather simply formulated: its mathematical model is the well-known problem of the knapsack. If installations are arranged not according to the economic effect of ASU's, but according to decrease in specific effectiveness (the ratio of effect to expenditures for creating ASU's), we actually come close to the algorithm for solving the knapsack problem. In such a modification, this method can be applied in the first stage of transition from completely empirical methods to planning based on economic and mathematical models; moreover, its subsequent conversion to computer, using an algorithm of exact solution, will be rather smooth (since the substance of the methods for plan calculation will not be changed).

In view of what has been said, the results obtained in reference 3 can be treated as a further development of the approach in reference 2 in the direction of refinement and elaboration of the problem statement (the disaggregation of constraints of capital investments on constraints of individual types of resources, and so forth) and its clear formalization in the form of an optimization model.

The approaches developed in references 5, 7, and 8 are based on the most developed mathematical models of the process being planned. They permit finding (for the corresponding planning object) the optimal dynamics for creating systems and the optimal scales for management/control automation (ASU variants) at installations.

It can be stated that the methods in references 2, 3, 5-7, and 8 lie in one direction, successively realizing the optimization approach with increasing completeness:

from a semi-verbal model to a formal one, from a monovariant cencept of ASU to a multivariant one, and from a static description to a dynamic one. At the same time, a fuller account of the various factors that characterize the process of management/control automation leads to a corresponding complication of the models and increased requirements for information support (both quantitative and qualitative). A necessary condition for the application of this group of methods is, as already said, the determination of expected indices of the systems at installations with potential for automation: in one variant (references 2 and 3) or several variants (references 5-7 and 8). The advisability of practical use of one or another model and the corresponding method of planning depends on the range of such indices that can be obtained with the needed degree of reliability. What is more, if at the time of composing the plan it is not possible with sufficient reliability to estimate the expenditures and effect for possible systems at specific installations, then turning to any of the "by installation" methods is pointless -- in this case the more suitable methods are those based on "averaged" systems. An important factor also is the significant increase in labor content of preliminary study of decisions on possible systems (system variants) and requirements for the qualification of specialists conducting this work with increasingly elaborate models.

Introduction into plan practice of "by installation" methods requires, in comparison with others, a more significant restructuring of the technology and organization of planning (particularly of those discussed in the foregoing section). But at the same time, they provide the possibility (naturally, with fulfillment of all conditions necessary for their application) to obtain a more justified plan.

According to the general character of the problems of "building into" planning practice, this group of methods is near to the methods proposed in reference 4, which also provide for preliminary study of basic decisions on future systems (forecast of ASU development). But, for this, it is characteristic, that estimates of expected economic effectiveness of ASU's are not used in plan development itself. They are taken into account to a definite degree only in the determination of the number of units that should be introduced during the plan period according to minimal, maximal, and intermediate plan variants (that is, in the formulation of constraints). Thereby, the problem is removed of the effect of the reliability of the quantitative values of these estimates on plan formulation, and this permits working with these methods of planning in cases when the effect has a non-economic character or when it is not possible to obtain sufficiently reliable quantitative estimates of the effect (including averaged estimates).

The use of "by volume" methods (references 10-12 and 13-15) does not require substantial change in plan development technology. They are advantageous under conditions when there are sufficient statistics on the actual effectiveness of operating systems, standards for expenditures of resources, and forecasts of the dynamics of effectiveness and expenditures for the plan period. The planning method described in references 13-15 is based on optimization modelling, and this makes it more preferable in comparison with the method of references 10-12, but requires more elaborate information. Therefore, the choice between them will depend on the presence of possibilities to obtain the necessary initial data. One should note the clear orientation of the approach in references 13-15 toward the interaction of the model apparatus and the nonformalized methods of decision making in the process

of plan calculations and the flexibility in formulating the criterion of optimality in the model for computer hardware distribution by ministries (although, perhaps, it is also excessive).

Having analyzed planning methods at the national economy level, one feature can be noted -- they seem to skip over the industry level, being oriented, in calculations, directly toward data on individual automation objects. Actually, this means that planning at the national economy level in accordance with such methods also encompasses those functions that should be accomplished in the development of industry plans. This is caused by the weak validity of industry plans for the automation of management/control and an insufficient degree of reliability of their indices, and this often does not allow the use of information on industry designs as an initial development of the plan for the national economy. However, such a way for overcoming existing shortcomings in industry planning (or more truly, an adaptation to it) can scarcely be recognized as promising; rather it should be looked upon as a palliative.

In our opinion, planning at the national economy level should be oriented toward an aggregated concept of the process of management/control automation in industries, taking into consideration in the calculations only the "inputs" and "outputs" of this process and not getting into its internal structure, the determination of which is a function of industry planning. *

A general shortcoming of the various methods for developing plans for creating ASU's is that the automation of management/control is regarded in isolation from the development of production. But only in the context of this process, in comparison with other routes to technical progress, and with traditional directions of development and on the basis of analysis of the influence of automation of management/control on the end results of production can the advantageousness of those or other routes and scales be substantiated. This problem was stated in reference 5, where one of the more possible approaches to its solution was also proposed. This problem is, in our opinion, one of the key problems in the area of planning the automation of management/control and, therefore, further research in depth is necessary in this direction.

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* In definite measure, this way has been adopted in the recent works devoted to the "Computer Technology" subsystem of ASPR (Automated System for Plan Calculations) (reference 17). But in them, at the same time, planning of management/control automation itself is displaced by planning for the development of its hardware base (distribution of computer hardware).

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LENINGRAD DEVELOPMENTS AID AGROINDUSTRIAL COMPLEX

Moscow SELSKAYA ZHIZN in Russian 14 Dec 85 p 2

[Article by Academician V. Govyrin, Doctor of Biological Sciences Professor L. Zherbovskiy, and Doctor of Biological Sciences Professor A. Khovanskikh (Leningrad); capitalized passages published in boldface]

[Text] In the accomplishment of the fundamental tasks on the acceleration of scientific and technical progress, which are posed in the draft of the Basic Directions, a special role is being assigned to such effective forms of the organization of scientific activity as intersectorial scientific and technical complexes and centers. It is possible to judge the great effectiveness of their work from the example of the interdepartmental coordinating council of the USSR Academy of Sciences in Leningrad, which was established 5 years ago.

This council unites academicians, professors, and candidates of sciences from more than 300 scientific organizations of the Northwest Region of the country. Acting in close contact with the Leningrad Scientific Center, the coordinating council carries out the procedural supervision and organization of the most important research, which is being conducted by institutes of this region, and contributes to the rapid introduction of developments in the national economy. It coordinates both basic research and the work which is aimed at the solution of important production problems in industry and agriculture. By the joint efforts of the department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin for the Nonchernozem Zone of the RSFSR, the interdepartmental coordinating council, and the Leningrad Scientific Center the specific tasks of the institutes of this center, as well as the sectorial scientific research institutes and higher educational institutions of the city on providing assistance to the agroindustrial complex were determined. These joint plans of scientific research work were included in the Intensification-90 Regional Comprehensive Program.

The interaction of academic and sectorial institutes and higher educational institutions is contributing to the increase of the efficiency of research and is speeding up the use of its results in practice. In this connection the seminar of scientists, which was recently held here and was devoted to the prevention and treatment of livestock and poultry at industrial complexes, comes to mind. Not only staff members of veterinary institutes, but also representatives of biological institutes of the USSR Academy of Sciences and

scientific research institutions of the USSR Ministry of Health actively participated in it. It turned out that the most interesting, promising research has been conducted at the meeting point of various sciences. Owing to the comprehensive approach the level of the developments themselves, many of which are quickly going into production, increased greatly.

For a long time at the poultry factories of the country, for example, the protection of chicks against coccidiosis was the most urgent problem. But owing to the joint efforts of scientists of the All-Union Scientific Research Veterinary Institute of Poultry Raising, the Zoology Institute, and the Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov of the USSR Academy of Sciences it was possible to find a truly effective means of combating this disease. The compound, which was synthesized as a result of joint development, has already received extensive practical application. The economic impact from its introduction came, according to the data of the USSR Poultry Raising Industry Administration, to more than 100 million rubles.

The joint research of the Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov, the Institute of Elementoorganic Compounds of the USSR Academy of Sciences, and the All-Union Scientific Research Institute of Plant Protection of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin is aimed at the development of the principles of the directed synthesis of new highly selective and, consequently, more effective and safe insecticides--means of combating insects which are crop pests.

The complex research, which was conducted by staff members of the Institute of Physiology imeni I.P. Pavlov of the USSR Academy of Sciences, the Institute of Physiology of the Azerbaijan SSR Academy of Sciences, and other scientific institutions of this republic, yielded an interesting result. They obtained a hybrid of the white sturgeon and spiny sturgeon--the beloship. As compared with the bester (a hybrid of the white sturgeon and sterlet), which is presently being used in fish breeding, it has a significantly greater growth rate. The breeding of the beloship proved to be very profitable, since in contrast, for example, to the European trout it grows on so-called trash fish. At present the pilot industrial tests of the beloship at one of the farms of Leningrad Oblast have been successful and an industrial installation for their raising is already being built.

The cooperation of the Institute of High Molecular Compounds of the USSR Academy of Sciences with the Leningrad Veterinary Institute in the development of effective compounds for the treatment of young agricultural animals is being carried out very fruitfully. While a method of the ultraviolet irradiation of the blood of animals was developed by the Institute of Cytology of the USSR Academy of Sciences in collaboration with the Leningrad Agricultural Institute and Veterinary Institute. It proved to be very effective in the treatment of both catarrhal and gastrointestinal diseases.

Now Leningrad scientists are actively participating in the development of new directions of domestic biotechnology, the need for the development of which is spoken about in the Basic Directions. Thus, scientists of the Institute of Cytology of the USSR Academy of Sciences, the Institute of Experimental Medicine of the USSR Academy of Medical Sciences, and the All-Union Scientific

Research Institute of the Breeding and Genetics of Agricultural Animals of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin are successfully developing the scientific and technical principles of biotechnology on the directed obtaining of highly productive and disease-resistant breeds of animals by the introduction in the embryonic DNA of genes which determine useful characteristics.

The intensification of the introducing activity of scientific organizations and the increase of their responsibility not only for the level of research and development, but also for their more complete use in production are spoken about in the draft of the Basic Directions. However, the process of introduction, as before, remains very lengthy and labor-consuming. Take, for example, the well-known compound iodinol, which was developed about 20 years ago at the Botany Institute of the USSR Academy of Sciences. It gave a good account of itself not only in medicine, but also in veterinary practice. Good results were obtained from its use in the food industry as a preservative for products. However, this compound so far is being produced in an extremely limited quantity. Will a chemical pharmaceutical plant of the appropriate type really not be found in the country? It will be found, of course. But here the main thing depends not only on the efforts of scientific organizations.

Therefore, we greet with fervor the provision of the draft of the Basic Directions on the strengthening of the contacts of science and production and on the development of such organizational forms of the integration of science, which make it possible to ensure the efficient and quick passage of scientific ideas from origination to extensive use in practice. It seems that in this connection it is advisable to supplement the third paragraph of Section VI "The Development of the Agroindustrial Complex and the Implementation of the Food Program," in which it is a question of the integration of agricultural science with production, with the following clause: "TO USE MORE EXTENSIVELY IN AGRICULTURAL SCIENCE AND PRACTICE THE ACHIEVEMENTS OF BASIC SCIENTIFIC RESEARCH DEVELOPMENT." For the problems of the scientific support of agriculture are such that they require the extensive participation of scientists of different fields of knowledge. A large reserve for the increase of the influence of science on agroindustrial production lies in this.

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CONFERENCES AND EXPOSITIONS

EXHIBITION OF DEVELOPMENTS OF SCIENTISTS OF BALTIC ACADEMIES

Riga SOVETSKAYA LATVIYA in Russian 22 Jan 86 p 1

[Article (LATINFORM): "The Cooperation of Academies"]

[Text] The scientists of Lithuania, Latvia, and Estonia have given for the first time a creative report to the national economy. The collectives of the academies of sciences of the Baltic republics presented their developments at the vast "Science for Production" Exhibition, which opened on 21 January in the hall of the Riga Center of the Propaganda of Urban Development and Architecture. Higher educational institutions, sectorial institutes, and planning and design organizations of the Latvian SSR were also participants in it. The review of scientific achievements, which was devoted to the 27th CPSU Congress, introduces advanced technological processes and models of the most modern equipment. From miniature electric motors to the most complex computer systems--such is the range of innovations being offered. They are shown in operating units and models, designs and illustrations.

Comrades B.K. Pugo, O.G. Anfimov, Ya.Ya. Vargis, A.V. Gorbunov, V.I. Dmitriyev, Yu.Ya. Ruben, and R.V. Praude attended the opening of the exhibition.

During the examination of the exposition specialists gave detailed explanations. Executives of the party and government of the republic took an interest in the developments, talked with the scientists, and noted the need for the strengthening of the contacts between the representatives of science and production and for the rapid advance into practice of the most important results of scientific research.

The academies of sciences of the Baltic region have taken steps in order to coordinate the research being conducted and to connect it more closely with the needs of the economy. The exhibition confirms precisely that, by working together, it is possible to successfully complement each other, to mutually borrow the gained experience, and to meet better the demands of enterprises, kolkhozes, and sovkhozes.

The priority themes in the plans of the institutes of the neighboring republics are followed from stand to stand. Their exhibits reflect different schools and methods of research and original approaches to the accomplishment

of the posed tasks. But in the directions being developed there are many points of contact. Take if only energy-saving equipment. Estonian scientists are devoting much attention to the control of losses of electric power, the storage of its surpluses during nighttime hours, and the smoothness of the operation of shale-burning and other electric power plants. While Latvian specialists have invented automatic devices--wall thermostats. It would be possible in winter to supply with the heat, which they save, one-fifth of the buildings in a modern city. Or there is another example. The heat engine, which was designed in Lithuania, is arousing universal interest. This is a unique "omnivorous" motor, which is capable of using any liquid fuel up to crude petroleum. The machine, which can be used in transportation and other economic facilities, saves up to 50 percent of the fuel.

The academic scientific centers of the Baltic region are making an appreciable contribution to the implementation of the Food Program. The assimilation of different versions of biotechnology, which makes it possible to obtain protein and other valuable fodder products from vegetable raw materials, has been started. Bioenergy plants have been produced and are being tested at livestock farms. New methods of increasing the fertility of soils, destroying insect pests, and protecting the environment against contaminants are being developed. Instruments for forecasting the yields have been developed. Effective veterinary compounds have been synthesized. The research in the indicated directions will be continued and intensified during the 12th Five-Year Plan.

Robot attachments, means for the protection of metals against corrosion, composite materials, medicines--this is far from a complete list of what has been included in the exposition. By making a wide choice available to the national economy, it will serve as the basis for the subsequent signing of contracts on cooperation between scientists and production workers. The review not only will indicate the successes, but will also reveal the shortcomings in introducing work and will make it possible to think over how to achieve their quickest elimination.

The precongress exhibition, which was organized by the Latvian SSR State Planning Committee and the Presidium of the republic Academy of Sciences, is mobile. It will also visit Lithuania and Estonia.

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GENERAL

SHORTCOMINGS IN STANDARDIZATION HINDER CREATIVE WORK

Moscow PRAVDA in Russian 5 Jun 85 p 3

[Article by A. Tarasov under the rubric "Returning to What Has Been Published": "Does It Promote or Hinder?"; first paragraph is PRAVDA introduction]

[Text] On 31 January of this year PRAVDA published the article "A Stimulus to Creative Work" by Hero of Socialist Labor B. Fomin, general director of the Leningrad Elektrosila Association. It was a question of the shortcomings in the matter of standardization and of the fact that petty tutelage paralyzes the creative work of designers and process engineers and hinders the output of new, higher quality products. The work of specialists is becoming complicated to the utmost by the bureaucratic merry-go-round.

The article evoked many responses from engineers, designers, and production managers, who are directly involved in the development of new types of products and scientific and technical developments. The opinion of the instances, which set the tone in technical standardization, interests all of them. This opinion was set forth in the response of the USSR Ministry of the Electrical Equipment Industry and the USSR State Committee for Standards. Judging from it, there can be no special grounds for alarm. "The majority of questions, which were posed in the article 'A Stimulus to Creative Work,' were previously raised by the Elektrosila Association. In September 1983 the State Committee for Standards, having generalized these questions and the suggestions of other ministries, departments, enterprises, and organizations on the improvement and simplification of the procedure of the drawing up of documents and their submitting for approval when developing new equipment, approved measures on their implementation. The State Committee for Standards and the Ministry of the Electrical Equipment Industry additionally approved a system of the standard technical support of the process of delivering items to production, the implementation of which will make it possible to decrease to one-half to two-thirds the number of standard documents necessary for this."

Bewilderment with regard to the alarm of the Elektrosila specialists due to the problems of standardization is also heard in the response. Indeed, if all the questions "were previously raised" and if decisions were made and approved, it is also high time to leave it at that!

However, tens of specialists, who sent letters to the editorial office, do not share this composure of the State Committee for Standards. A completely different picture comes to light in their statement. I will begin with the same Leningraders. In front of me are the minutes of a technical conference of the managers of standardization services and specialists of enterprises of the city. There are 27 signatures of representatives of enterprises of 9 ministries. Among them are such well-known ones as Krasnaya zarya, Lenpoligrafprom, Kirovskiy zavod, Baltiyskiy zavod, Izhorskiy zavod, Nevskiy zavod imeni V.I. Lenin, and others. The first lines of the minutes raise the alarm anew.

"In recent years the State Committee for Standards has issued a large number of standards, documents for guidance, and directive letters. The requirements contained in them, as a rule, excessively detail and complicate the organization of work, increase the labor intensiveness and time of the development and assimilation of items, decrease the pace of scientific and technical progress.... As a result a significant portion of the time of designers, process engineers, and other personnel of enterprises is being diverted from the development of new equipment to work which neither the producers nor the users of such products need."

In the opinion of the conference participants, the basic cause of the existing shortcomings is the fact that the functional administrations of the State Committee for Standards and its institutes have lost touch with practice and do not take into account the opinions of specialists of industry.

It is characteristic that the specialists in standardization themselves on the job treat very critically the zeal of their colleagues from the main organizations. "We completely agree with the publication in PRAVDA and want to note that the USSR State Committee for Standards in its work on increasing the quality of materials and items has veered off in the direction of dealing out documents, obviously believing that the more standards that are issued, the higher the quality of work and the output being produced will be," Candidate of Technical Sciences V. Yuzhin, chief of the Department of Standardization of the Okhtinskiy Plastpolimer Scientific Production Association, writes. Having cited a specific example, he concludes: "Why one would make a handbook out of a standard is incomprehensible! For unproductive labor and hundreds of kilograms of paper lie behind this."

The unit, which, judging from the main, is suffering most, is the same one that is called upon to advance scientific and technical progress resolutely in modern production. That is, the engineering and design unit. Here are several characteristic admissions.

V. Ivanov, a specialist of the Mogilevliftmash Production Association: "Although our enterprise is much more modest that Elektrosila, the shortcomings of the work of the State Committee for Standards also fully concern us. Whereas 20-25 years ago the designer spent the basic energy on the elaboration directly of a design, now the satisfaction of the requirements of a large number of all-union state standards, all-union standards, specifications, and other guidance materials, which at times contradict each

other, is becoming the main thing. The designer does not have the right to select independently the diameter of the hole for a fastening bolt or screw." The author cites the example of when in a 37-page all-union standard, which consists of 9 sections and 142 paragraphs ("Elevators. The General Specifications"), in 18 months from the moment of its introduction changes were made with respect to 43 paragraphs on 13 pages. The designer poses an urgent question: "Any work should yield an economic or some other impact. But who can determine it, when for the introduction of the all-union standard it is necessary to nullify the developed document and technological process, to throw out the available accessories, and in practice to assimilate the same part all over again?"

Not by chance are quite caustic reviews of standards written at times by experienced workers. V. Osminin and V. Vasilchuk, specialists of the Mikroprovod Scientific Production Association from Kishinev, write: "What is All-Union State Standard 20.207-83 'The Unified System of Design Documentation. The State System of Industrial Instruments and Automation Equipment. The Basic Provisions,' which was just received by us for mandatory introduction, worth? Well, we read it. The text of the standard was placed on 3 pages. It was drawn up by 13 performers (among them are 8 candidates of technical sciences and 1 academician). Here is what, for example, is established in Paragraph 2.3: 'The formulation of the demands on items of the State System of Instruments should be carried out by the developers of the systems jointly with the developers and producers of the items of the State System of Instruments with allowance made for the maximum satisfaction of the requirements of the user.' Obviously, in a translation into Russian this sounds as follows: 'The rescue of drowning people is the affair of the drowning people themselves with the maximum satisfaction of the requirements of the observers.'" It came to standards of three levels for one item, and the authors of this letter not without reason say ironically: "Is it impossible to eliminate the performers, who occupy the two unnecessary levels, and transfer them to the sphere of production, where there are not enough workers and, at times, scientific and technical ideas?"

It is possible to cite quite a number of bitter and perplexed words from many other letters. Their point is the same--such a situation hinders work. But everything that hinders work should be resolutely eliminated. It is intolerable that when drawing up plans of standardization, A. Kogan, an engineer from Lvov who has worked for 28 years at a large instrument making special design bureau, believes, these services would be guided not by the actual needs of production, but by the principle: "What else is it possible to standardize?"

No one is saying that standards are not needed at all. "It is one thing when standards oblige the subdivisions of different ministries and departments, which produce a similar product, to produce it with a good quality, with the optimum input and output parameters, which are bound with other dimensions, indicators, and so on. It is impossible not to welcome this. It is a completely different thing when formal, insignificant changes are made in the prevailing documents and for these reasons a mass of millions of drawings, diagrams, and specifications requires revision. The plans of work on the

improvement of designs, the testing of new developments, and the changeover to a new, advanced technology are pushed aside. All the forces go into the breach, 'to bring things in line'." Such is the opinion of A. Pyptev, a design engineer from Smolensk.

Many specialists regard the content of some standards to be simply involved and cite many such examples. But the avalanche is growing and growing. "In my opinion, the existence in the country of more than 26,000 state and more than 50,000 sectorial standards cannot serve as a gauge of the good quality of work on standardization," asserts A. Fedostsev, deputy technical director of the Gorkiy Motor Vehicle Works, to whose enterprise not less than 500 drafts of various standards are delivered annually. "The state system of standardization, it would appear, does not have objective criteria for the making of decisions on the advisability and possibility of the standardization of one object or another, therefore, there is such a diversity of standards, and their number is continuing to increase."

What is to be done? Might it be that one should not think up anything new, but fulfill capably and without emergency jobs the already adopted decisions? "We were repeatedly given suggestions on the simplification of procedures and the decrease of the labor intensiveness of the elaboration and coordination of standards. A portion of these suggestions were approved and accepted for implementation by the decree of the State Committee for Standards of 29 September 1983 and the joint decree of the State Committee for Standards and the USSR State Committee for Science and Technology of 21 June 1984. However, as was quite justly noted in the article of B. Fomin 'A Stimulus to Creative Work,' they are being implemented slowly and not effectively enough," write the specialists of the Leningrad Gipromashobogashcheniye Institute led by B. Orlov, its director.

But here, too, there is an obvious difference of opinions. The State Committee for Standards is putting down to its own credit the establishment of a unified depersonalized classification system of the designation of items and documents (All-Union State Standard 2.201-80 and the classifier of the Unified System of Design Documentation). A heavy moan escapes the mouths of production engineers: "The classifier of the Unified System of Design Documentation is an abstract, pedantically drawn up document. It is noninformative. The items envisaged by it lack interconnection (quicksand) and do not contain any concept of the purpose of the items. It will be an obstacle in the large amount of work on the assurance of the applicability of the items and the standardization and specialization of their production." S. Chelov, a senior scientific associate of one of the Leningrad institutes, voiced the opinion of many.

Whom is one to believe--him, who reports on his work by the number of papers and documents, or him, who measures his labor directly by finished machines, devices, instruments, and a large number of other items?

Obviously, in each matter one must not forget the basis. Without standards in our life--in production, in daily life--chaos would reign. However, the standard is not only technical and production discipline and high product quality, but also a powerful stimulus of the development of the latest

equipment and technology. And this motive force of progress should not be turned into an obstacle. If this happens, hence, someone has made a mess of something. And has confused others.

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